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UNIVERSITÉ DE MONTRÉAL

RELATIONSHIPS BETWEEN PERFORMANCE MEASUREMENT SYSTEMS, INTRAPRENEURIAL CULTURE AND INNOVATION CAPABILITIES: A LONGITUDINAL FIELD CASE STUDY

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RÉSUMÉ

Tandis que l'innovation est une source clé de succès à long-terme, les compagnies établies perdent souvent leurs Capacités d'Innovation au profit de l'efficacité opérationnelle. D'un côté, la Culture Corporative Intrapreneuriale a souvent été corrélée avec des Capacités d'Innovation élevées. D'un autre côté, les Systèmes d'Évaluation de la Performance (PMS) jouent un rôle dans les types de projets qui sont priorisés, et peuvent ainsi nuire à l'innovation.

Cette étude explore les relations entre la Culture Intrapreneuriale, les PMS et les Capacités d'Innovation, un sujet rare dans la littérature. L'objectif est d'atteindre une meilleure compréhension des dynamiques transformationnelles requises pour aider une compagnie établie à redynamiser ses Capacités d'Innovation. Une approche de recherche inductive a été jugée appropriée pour cette étude puisque l'intention est de mieux comprendre des dynamiques humaines complexes. Un concept de recherche itérative, basé sur une combinaison de quatre stratégies de recherche ainsi que de multiples méthodes de collecte de données, a été développé pour aider à combler l'écart entre la pratique et la littérature sur le sujet de recherche. Le modèle 'Niveaux de Perspective' a été utilisé pour organiser et analyser les données.

Grâce à la stratégie de recherche intervention il a été possible d'expérimenter directement les défis principaux et les tensions liés à la redynamisation des Capacités d'Innovation dans une compagnie orientée vers l'exécution. Les défis principaux identifiés grâce à cette étude de cas sont : (1) l'aversion au risque, (2) la mentalité d'exécution, (3) le manque d'alignement interne, (4) le manque d'alignement environnemental, et (5) le bas niveau de maturité des processus d'innovation. Trois prérequis inter-reliés à une mise en œuvre réussie d'indicateurs de performance clés (KPIs) pour mesurer le succès des projets d'innovation ont été identifiés : (1) un niveau minimal de maturité des processus d'innovation, (2) l'alignement stratégique, et (3) l'engagement envers l'innovation.

La méthodologie de la théorisation enracinée a été utilisée pour conceptualiser les observations terrain et développer quatre propositions de recherche et un cadre conceptuel qui pourraient être plus amplement explorés dans de futurs projets de recherche. La première proposition suggère qu'une compagnie orientée vers l'exécution qui introduit des objectifs stratégiques, PMS et systèmes de récompenses alignés avec l'innovation, pourrait stimuler des initiatives innovantes et supporter un développement futur de Capacités d'Innovation et d'une Culture Intrapreneuriale. La

seconde proposition stipule qu'autrement les employés sont susceptibles de résister à la mise en œuvre d'initiatives et mesures d'innovation, et de prioriser des KPIs orientés vers l'exécution même pour mesurer l'innovation, renforçant ainsi la culture orientée vers l'exécution et nuisant au développement de Capacités d'Innovation. De plus, certains apprentissages de cette étude suggèrent que lorsque l'objectif est de redynamiser les Capacités d'Innovation dans une compagnie orientée vers l'exécution, il est plus efficace de commencer par l'introduction de KPIs qui stimulent des comportements favorables à l'innovation plutôt que des KPIs qui visent à mesurer le succès des activités d'innovation (Proposition 3). Lorsque la compagnie atteint un niveau plus élevé de maturité des processus de gestion de l'innovation et développe une Culture plus Intrapreneuriale, la mise en œuvre de KPIs pour mesurer la performance de l'innovation aura plus de chances de succès (Proposition 4). Cette étude se conclue avec une hypothèse qui pourrait être plus amplement explorée lors de recherches futures : différents types de KPIs sont appropriés pour différents niveaux de maturité des processus de gestion de l'innovation.

Les contributions principales de cette étude sont les apprentissages sur les relations dynamiques entre la Culture Intrapreneuriale, les PMS et les Capacités d'Innovation qui ont été possibles grâce au design de recherche terrain unique utilisé.

ABSTRACT

While innovation is a key driver of long term success, established companies often lose their Innovation Capabilities for the sake of operational efficiency. On one hand, Intrapreneurial Corporate Cultures have often been correlated with high Innovation Capabilities. On the other hand, Performance Measurement Systems (PMS) play a role in the types of projects that are prioritized, and can hinder innovation.

This study explores the relationships between Intrapreneurial Culture, PMS and Innovation Capabilities, a subject that is sparse in the literature. It aims to achieve a better understanding of the transformational dynamics required to help an established company rejuvenate its Innovation Capabilities. As the intent of this study is to better understand complex human dynamics, an inductive research approach was considered appropriate. An iterative research design with a combination of four research strategies and multiple data collection methods was developed to help bridge the gap between practice and literature on the research subject. The 'Levels of Perspectives' iceberg model was used to help organize and analyze the data.

As a result of the intervention-research strategy, it was possible to experience firsthand key challenges and tensions of the rejuvenation of Innovation Capabilities in an execution-oriented company. The key challenges identified through this Case Study are the company's (1) risk aversion, (2) execution mindset, (3) lack of internal alignment, (4) lack of environmental alignment, and (5) low level of maturity of innovation processes. Three interrelated prerequisites to the successful implementation of Key Performance Indicators (KPIs) to measure innovation success were identified: (1) minimal level of maturity of innovation processes, (2) strategic alignment, and (3) commitment to innovation.

Grounded Research Theory was used to make sense of the field observations and provide four research propositions, as well as a conceptual framework that could be further explored in future research. Our first proposition suggests that an execution-oriented company that introduces well-aligned innovation-oriented strategic objectives, PMS and reward systems could stimulate innovation initiatives and support the future development of Innovation Capabilities and of an Intrapreneurial Culture. Our second proposition states that otherwise, the employees are likely to resist implementation of innovation initiatives and measures, and prioritize execution-oriented KPIs, even to measure innovation, further reinforcing the execution-oriented culture and impeding

the development of Innovation Capabilities. Moreover, learnings from this study suggest that when the goal is to rejuvenate Innovation Capabilities in an execution-oriented company, it is more effective to begin with the introduction of KPIs that stimulate behaviours conducive to innovation rather than KPIs that aim to measure the success of innovation activities (Proposition 3). When the company reaches a higher level of innovation management process maturity and develops a more Intrapreneurial Culture, the implementation of KPIs to measure innovation performance will be more likely to succeed (Proposition 4). This study is concluded with a hypothesis that could be further explored in future research: different types of KPIs are appropriate for different levels of innovation process management maturity.

This study's main contributions are the learnings on the dynamic relationships between Intrapreneurial Culture, PMS and Innovation Capabilities made possible by the unique field research design used.

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LIST OF SYMBOLS AND ABBREVIATIONS

AIM	Agile Innovation Management
BCG	The Boston Consulting Group
BPM	Business Process Management
BSC	Balanced Scorecard
CE	Corporate Entrepreneurship
CEO	Chief Executive Officer
CV	Corporate Venturing
ECV	External Corporate Venture
EO	Entrepreneurial Orientation
EVC	Economic Value for Customers
EVP	Executive Vice President
FEI	Front-End of Innovation
GQ	Guiding Question
ICV	Internal Corporate Venture
IoT	Internet of Things
IPMS	Innovation Performance Measurement System
IQ	Innovation Quotient
IRDT	Innovation, Research & Development, and Technology
ISPIM	International Society for Professional Innovation Management
KPI	Key Performance Indicator
LHF	Low Hanging Fruits
MIC-CSE	Multisectorial Industrial Research Chair in Coatings and Surface Engineering
MoM	Minutes of Meeting

NPD	New Product Development
OTD	On-Time-Delivery
PMO	Project Management Office
PMS	Performance Measurement System
PDP	Product Development Process
R&D	Research & Development
R&NPD	Research & New Product Development
RQ	Research Question
SME	Small & Medium-sized Enterprise
SWOT	Strengths, Weaknesses, Opportunities and Threats
VoC	Voice of Customers
VP	Vice president

LIST OF APPENDICES

CHAPTER 1 INTRODUCTION

This chapter introduces the necessary research context and background. Section 1.1 explains the purpose of the study and presents its research question. Section 1.2 introduces the relevance of this study for innovation management research. The research structure and its guiding questions are briefly presented in section 1.3. The background necessary to understand the context of the Partner Company is presented in section 1.4. Section 1.5 describes the significance of this research and presents an overview of the thesis.

1.1 Research Purpose

The author's desire to better understand and describe organizational change dynamics as well as identify key management and organizational levers to drive change within a tech-oriented Company are at the root of this research project. The author's interest toward this research subject first came from her professional experience in developing an intrapreneurial culture as well as implementing a full Performance Measurement System (PMS) in a traditional engineering consulting company. The author's purpose in doing this research is to gain better understanding on how to help a well-established traditional company transition toward a more dynamic and intrapreneurial enterprise with higher Innovation Capabilities.

This can be done through various means. While searching to narrow the subject of the study, an opportunity to join the second phase of an ongoing longitudinal research on innovation management in a manufacturing company presented itself. More information on this longitudinal study is available in section 3.3. One of the partner company's needs was the development of innovation Key Performance Indicators (KPIs). A preliminary literature review confirmed the adverse effects that PMS can have on the development of Innovation Capabilities (Christensen, 1997). This allowed us to narrow the research subject, as the author had experience with the challenges associated with the development of a PMS as well as interest in its role in the development of Innovation Capabilities. This resulted in the following Research Question (RQ):

What are the interrelations between Corporate Culture, PMS and Innovation Capabilities?

The author joined the research group with the mandate to support the partner company in the development of innovation KPIs. The details of this mandate are described in section 1.4.2.

1.2 Research Relevance

Approximately half of the Fortune 500 companies from the 1970s and the 1980s have disappeared or have been acquired (Galanakis, 2006). The lifespan of current Fortune 500 companies is constantly decreasing (L. Morris, 2009). Innovation has been identified as "the major factor of economic growth and wealth" by the EU (1995) and OECD (1997) (Galanakis, 2006). This is supported by a number of scholars who recognize a positive link between innovation and firm performance (Alegre, Lapiedra, & Chiva, 2006; Turró, Urbano, & Peris-Ortiz, 2014).

However, as companies grow and establish more efficient operations, they often lose their Innovation Capabilities (Christensen, 1997; Pinchot III, 1985). For the purposes of this study, the definition of Innovation Capabilities by Olsson, Wadell, Odenrick, and Bergendahl (2010) is used: the "ability to continuously develop innovations as a response to a changing environment". Indeed, the development of an organization with a good balance between efficient operations to ensure short-term profitability, and space for creativity and innovation to ensure future prosperity is a significant challenge (O'Reilly III & Tushman, 2004; Perez-Freije & Enkel, 2007; Pinchot III, 1985; Sundgren, Dimenäs, Gustafsson, & Selart, 2005). Tellis, Prabhu, and Chandy (2009) believe that companies tend to invest great resources into protecting the stream of revenue coming from their current products and services, vetoing any change that might threaten the security of their profits. According to Kanter (1985), there are three steps toward innovation:

1. Providing the flexibility and speed of action required for innovation. This implies dealing with current systems, structures and practices that might represent roadblocks;
2. Providing incentives and resources for entrepreneurial projects;
3. Pursuing business synergies.

Technical innovation can materialize in different ways in companies, such as Research & Development (R&D), New Product Development (NPD) and Technological Development. A number of studies suggest that control systems and PMS have a significant impact on NPD process performance (Cooper & Edgett, 1996; Griffin, 1997; Hart, Hultink, Tzokas, & Commandeur, 2003; Jiménez-Zarco, Martínez-Ruiz, & González-Benito, 2006; Neely et al., 2000; Neely, Richards, Mills, Platts, & Bourne, 1997). Indeed, the wrong type of PMS can hinder the firm's Innovation Capabilities (Christensen, 1997; Perez-Freije & Enkel, 2007; Ries, 2011). Moreover, according to surveys by McKinsey (Chan, Musso, & Shankar, 2008) and The Boston Consulting Group (BCG)

(Andrew, Manget, Michael, Taylor, & Zablit, 2010), most enterprises believe they have to improve their Innovation Performance Measurement Systems (IPMS), as less than 41% think that they are effective.

Intrapreneurial Corporate Cultures have often been strongly correlated with innovation (Covin & Miles, 1999; Ireland, Covin, & Kuratko, 2009; Schumpeter, 1934; Zahra, 1995). However, there is little research on the interactive relationships between control mechanisms and intrapreneurship (Goodale, Kuratko, Hornsby, & Covin, 2011; M. H. Morris, Allen, Schindehutte, & Avila, 2006). There is also a paucity of literature on the impacts of the use of IPMS on Innovation Capabilities (Godener & Soderquist, 2004) and little work on how to provide a complete PMS to evaluate NPD performance and success (Jiménez-Zarco et al., 2006).

Hence, when looking to understand how to rejuvenate Innovation Capabilities in an established company, there is an interest in exploring the *relationships between PMS, Intrapreneurial Culture, and Corporate Innovation Capabilities*.

1.3 Research Structure

This study is part of phase II of a broader longitudinal intervention-research on the development of innovation management processes and tools with the same Partner Company, as explained in more detail in section 3.3. Grounded Theory is the preferred research strategy of the director of this longitudinal research.

The author's professional background in change management is particularly appropriate for field research in order to bridge the gap between literature and practice (Rousseau, 2006; Schein, 1999). Therefore, joining a field intervention in a partner company seemed like an appropriate fit. Such an approach implies that this study is explorative. Its design, mainly based on the Grounded Theory Methodology, is iterative, as the research steps are adapted based on previous outcomes. This is explained in more detail in Chapter 3 and illustrated in Figure 3.1. In addition to the RQ presented in section 1.1, guiding questions (GQs) were developed to help orient the preliminary literature review as well as the observations in the beginning of the mandate:

> GQ 1: What are the dynamic relationships and mutual reinforcement mechanisms between a company's Culture and its PMS?

GQ 2: How do the specific contexts created by the combinations of Culture and PMS influence, improve or deteriorate the company's Innovation Capabilities?

GQ 3: What kind of PMS is more appropriate to stimulate Innovation Capabilities in an established company?

GQ 4: How could PMS reinforce or kill the seeds of the Intrapreneurial Culture needed to foster long-term Innovation Capabilities?

GQ 5: What dimensions of an Intrapreneurial Culture are most important to implement or change in order to stimulate Innovation Capabilities?

1.4 Research Site

This section first provides the background of the Partner Company in section 1.4.1. Section 1.4.2 explains the specific mandate of the author of this thesis within the Company. Finally, the existing PMS as well as Corporate Culture are described respectively in sections 1.4.3 and 1.4.4.

1.4.1 Company Background

The Partner Company (hereafter referred to as the "Company") is a specialized manufacturer offering a wide range of both customized solutions and specialized products. It evolves within a fragmented industry with hundreds of competitors. Over several decades, the Company has grown organically by broadening its product offerings and acquiring strategic competitors. Throughout its history, there has been a series of significant inventions and innovations driven by the company's founder, who retired only a few years ago. The Company evolves according to the 3-generation model proposed by Hiebl (2015): following the first generation entrepreneur-inventor, the second generation shows a focus on operations and acquisitions at the expense of the entrepreneurial spirit, while the third tries to rejuvenate innovation by implementing innovation management best practices, processes and tools (Brodeur, Deschamps, & Lakiza, 2017).

Recently facing a steady sales decrease in well-established markets and product lines, the Company embarked on a major revitalization journey with multiple organizational changes including a new innovation strategy. Structural changes involved the creation of a Project Management Office (PMO), and an Innovation, R&D and Technology (IRDT) group within the Engineering department. The IRDT group, formed by merging several specialized engineering groups, began

the implementation and formalization of several innovation management processes, methods, tools and best practices, including Robert Cooper's Stage-Gate ® (Cooper, 2008) which was the subject of the first Case Study during the first phase of our longitudinal research (Brodeur et al., 2017). At the Company, the IRDT group and the marketing department share responsibility for innovation. Consequently, while the research group was primarily part of the IRDT group during the field research, an important part of the interactions included work with marketing stakeholders.

The Company's revitalization journey also included the appointment of their first non-family member as the Company's President and CEO. During the first years of his mandate his main focus became to fix the Company's operational issues that were causing major delivery delays. The PMO was created to contribute to this goal and was given important resources as well as legitimacy.

1.4.2 The Mandate within the Partner Company

Our research team began its longitudinal field study in summer 2015 when these different changes were being initiated. Each researcher oversaw a specific innovation management subject, as explained in more detail in section 3.3. With respect to the specific research covered in this thesis, the author was on the field for the duration of phase II of the longitudinal research, from June 2016 to May 2017. The longitudinal research was financed by the Mitacs Accelerate program, which contributes to bridging the gap between literature and practice by supporting graduate student mandates in industry. It has two primary objectives:

- Knowledge transfer by testing theories in industry;
- Knowledge development by bringing learning back to literature.

In line with the first objective and in addition to the research subject of this thesis, the author was given a specific mandate at the Partner Company. The mandate was to support the development of innovation Key Performance Indicators (KPIs) with the goal of measuring the success of innovation endeavours. The Company wanted to measure its overall technical innovation performance. This included their NPD projects, their R&D and Technology development efforts as well as innovation on customer orders. The objective was to propose a small number (3 to 5) of simple indicators covering the overall performance of all the types of technical innovation projects.

In addition to the subject of this thesis and the innovation KPI development project, the role of the author of this thesis within the research group was to ensure overall synergy among the work of

the three researchers present during phase II and to better understand the Company's organizational culture and change management dynamics.

1.4.3 The Company's Existing PMS

During the author's presence in the field, the Company had multiple data management systems that were specific to the departments that were using them. They were mainly developed in-house throughout the Company's history. Few links existed between the systems and little access was given to a system of a different department.

At the time of this study, the new CEO had recently implemented a new executive scorecard. Half of the ten KPIs chosen were short-term financial indicators and none of the KPIs were about innovation (Lakiza & Deschamps, 2018). In addition, an initiative of the IRDT group to develop indicators to assess the performance of their NPD projects was carried out during the first phase of the longitudinal research. This initiative was performed independently of the research team. This effort resulted in the proposition of 38 indicators. Only 24 were implemented. The other 14 were not implemented as they were difficult to measure with the existing data management systems. These NPD indicators were developed based on a brainstorm and were not strategically linked to the executive scorecard. In addition, most of the indicators had no specific goal attached (Lakiza & Deschamps, 2018). This set of performance indicators had too much data, most of which is easy to collect but not necessarily useful. According to Neely (1998), this is a typical problem. Some stakeholders mentioned that the 14 indicators that were not implemented seemed like the most important ones.

1.4.4 The Company's Corporate Culture

Based on work done during phase I of the longitudinal research at the Company (Brodeur et al., 2017; Deschamps, Lakiza, Beaulieu, Houllier, & Brodeur, 2016; Deschamps et al., 2017), this study is built on the following premises:

- At the Partner Company, Innovation is generally treated as a set of initiatives as opposed to being part of a well-integrated strategy;
- The Company's top priority at the time of our study is to fix operational issues such as on-time-delivery (OTD) and important resources are being invested to do so;

- Throughout the Company's history, sales-driven innovation has always been prioritized over long-term technological and product development;
- Throughout the Company's history, innovation was mostly led by a small number of inventive individuals who had the power to bypass formal processes because they were family members or friends;
- The Company is risk-averse and short-term oriented.

Based on these premises, we infer that this study is conducted within what we call an 'execution-oriented Company'. In this study, 'execution' refers mainly to short-term actions as opposed to long-term, systemic and strategic thinking. We define the ***execution-oriented culture*** as "a reactive, stagnant and risk averse culture where day-to-day operations are prioritized over long term development" (Lakiza & Deschamps, 2018). In such a culture, a relatively small group of isolated people push for the development of innovation management. Therefore, it is an opportunity to observe innovation rejuvenation efforts within a context where it is not a priority and it is not fully aligned with the overall Company strategy. The employees are used to executing orders without making sure that what they are working on is actually useful and with little formal encouragement to be intrapreneurial. Consequently, the current Company environment does not seem favorable to innovation. It is typical for a Company with past innovation success to not pay sufficient attention to new technologies, business models and competitors (Rao & Weintraub, 2013). This is how, after one innovative generation, a company can become a bureaucracy the next generation (Rao & Weintraub, 2013).

Moreover, during phase I of the longitudinal research it was possible to observe the Company's highly centralized and informal management style and decision-making approach (Brodeur et al., 2017). As a result, even though the Company has near 2000 employees, it was assessed during phase I that on several levels it operates like a medium enterprise (Deschamps et al., 2016). Indeed, most of the challenges typically experienced by Small and Medium-sized Enterprises (SMEs) when implementing PMS, were present at the Partner Company (for more detail see section 2.3.5).

1.5 Significance of the Study

The intent of this study is to contribute to the knowledge development on the dynamic relationships between a company's Corporate Culture, its PMS and its Innovation Capabilities. The literature pertaining to these three concepts is reviewed in Chapter 2. Based on a single case study, this

research cannot test hypotheses nor serve to develop generalizable results. Yet, our aim is to make sense of field observations in industry in order to put forward propositions and a conceptual framework that could be further tested in future research. Chapter 3 describes the methodology and the detailed research design used to carry out this research.

The author hopes to contribute to the thinking of practitioners wishing to rejuvenate their company's Innovation Capabilities. This study provides learning on potential challenges practitioners can meet when trying to implement an IPMS within an execution-oriented Company. These challenges, as well as the research findings and propositions, are presented in Chapter 4. The author's hope is that this study will help bridge the gap between practice and literature regarding the chosen subject. The conclusions of this thesis, as well as thoughts on future research, are presented in Chapter 5.

CHAPTER 2 LITERATURE REVIEW

For this study, the literature was reviewed using primary, secondary and tertiary sources. To begin, a search of tertiary sources was done using the ABI Inform and Compendex databases. The chosen research parameters are presented in Table 2.1. The research terms were defined using relevance trees developed based on the research question presented in section 1.1 as well as the five guiding questions presented in section 1.3. State of the art articles were prioritized in the beginning to better understand the key terms and get to know the main authors in order to refine future searches. This also helped identify key seminal articles and other relevant references. The literature review was judged sufficient when further searches started to refer mainly to articles already read (Saunders, Lewis, & Thornhill, 2011).

Table 2.1: Research Parameter Choices

Research Parameter	Choices
Language of Publication	English, French, Spanish, Russian, Ukrainian
Subject Area	Innovation management
Business Sector	Manufacturing, engineering
Geographical Area	North America, Europe
Publication Period	Last 10 years
Literature Type	Journals, books, conference proceedings

This chapter presents the key highlights of the literature reviewed. Section 2.1 summarizes the main concept definitions on innovation and Innovation Capabilities. It is followed by a more comprehensive review of literature on Intrapreneurship and Corporate Culture in section 2.2. Section 2.3 provides an overview of the relevant literature on innovation performance measurement and how it can be used in the contexts of innovation and Intrapreneurship. Table 2.2 summarizes how the key research concepts are covered by this literature review. Table 2.3 presents an overview on how the literature review sections help respond to the GQs. A short critical literature review based on the GQs concludes this chapter in section 2.4.

2.1 Innovation

In this study, the definition of innovation by Galanakis (2006) is used: “the creation of new products, processes, knowledge or services by using new or existing scientific or technological knowledge, which provide a degree of novelty either to the developer, the industrial sector, the nation or the world and succeed in the marketplace”. It is important to highlight the last part of this

definition, as the terms innovation and invention are sometimes used interchangeably. Innovation is an invention that also involves commercialisation (Galanakis, 2006; Pinchot III, 1985; Porter, 1990). Roberts (2007) makes a clear distinction between innovation and invention by presenting it as follows: Innovation = Invention + Exploitation where invention focuses on generating a new idea and making it feasible while exploitation aims to adapt the invention for a market and commercialize it.

Table 2.2: Coverage of the Key Research Concepts in the Literature Review

Research Concept	Section	Purpose of the Section
Innovation Capabilities	2.1.2 Innovation Capabilities	Clarifies the concept of Innovation Capabilities.
Intrapreneurial Culture	2.2.1 Intrapreneurship	Clarifies the concept of Intrapreneurship.
PMS	2.3.1 Control Function	Describes the evolution and purposes of the control function.
	2.3.2 Functions of PMS	Describes the main functions of PMS.
	2.3.3 Overview of PMS History	Describes the evolution of PMS and its key perspectives.

According to Kuratko, Covin, and Hornsby (2014) there are four key issues that hinder successful implementation of corporate innovation: (1) understanding what type of innovation is being sought, (2) coordinating managerial roles, (3) effectively using operating controls, and (4) properly training and preparing individuals. The importance of innovation for better firm performance is further discussed in section 2.1.1. The meaning of one of the three key terms of the research subject, Innovation Capabilities, is clarified in section 2.1.2.

2.1.1 Innovation and Firm Performance

There are numerous ways of categorizing innovation. While sustaining technologies foster improved product performance, the disruptive ones often start with a worse product performance but bring a new and different value to a market by being “typically cheaper, simpler, smaller, and, frequently, more convenient to use” (Christensen, 1997). Christensen (1997) adds that sustaining and disruptive innovations can both be either incremental or radical in nature. The author purports that regular PMS can hinder a company’s ability to develop successful disruptive technologies.

Regular PMS typically encourage sustaining activities in order to please existing customers by providing them with improved performance.

Table 2.3: Overview of the Links between the Literature Review and the GQs

Guiding Question	Section	Purpose of the Section
GQ1: Dynamic relationships and mutual reinforcement mechanisms between Culture and PMS	2.3.6 PMS and Intrapreneurial Culture	Discusses the tensions between PMS and intrapreneurship. There is little literature on the actual reinforcement mechanisms that are an interest of this study.
GQ2: How do contexts created by combinations of Culture and PMS influence Innovation Capabilities?	While this is touched upon in the literature on the links of PMS and intrapreneurship, no literature was found specifically on this triple relationship. This supports the need to explore this subject further.	
GQ3: What kind of PMS is more appropriate to stimulate Innovation Capabilities in an established company?	2.3.4 Overview of PMS to Measure Innovation Performance	Covers the literature on suitable PMS and metrics for innovation, areas of measurement as well as gaps between practice and literature, and gaps between the popular metrics and the useful ones.
	2.3.7 Innovation-oriented PMS vs Execution-oriented PMS	This section and Table 2.5 summarize the key characteristics of PMS that seem more appropriate for innovation.
GQ4: How could PMS reinforce or kill the seeds of the Intrapreneurial Culture needed to foster Innovation Capabilities?	2.3.6 PMS and Intrapreneurial Culture	Discusses the tension between PMS and intrapreneurship.
GQ5: What dimensions of an Intrapreneurial Culture are most important to implement or change in order to stimulate Innovation Capabilities?	2.2.2 Corporate Culture and Innovation	Describes the importance of Culture for innovation, cultural dimensions influencing Innovation Capabilities, and diagnosis of an innovative Corporate Culture.
	2.2.3 Intrapreneurial Culture and Innovation	Discusses key dimensions of an Intrapreneurial Culture for Innovation.
	2.2.4 Role of Management Practices in Intrapreneurship	Leadership is one of the key dimensions identified in literature for successful intrapreneurship and innovation.
	2.2.5 Intrapreneurial vs Execution-oriented Culture	This section and Table 2.4 summarize the key characteristics of an Intrapreneurial Culture that can stimulate innovation.

While sustaining and incremental innovation is important to meet today's market demands, disruptive and radical innovation is necessary to ensure a company's long-term survival (Christensen, 1997; Galanakis, 2006; Godener & Soderquist, 2004; Koetzier & Alon, 2013; Pinchot III, 1985; Tidd, Bessant, Pavitt, & Wiley, 1998; Utterback, 1994). Without disruptive innovation, chances are that current or future competitors will come up with something that will eventually change the industry's basis of competition and put some of the most successful companies out of business (Christensen, 1997; Utterback, 1994).

Following a study of 184 manufacturing firms in Turkey, Gunday, Ulusoy, Kilic, and Alpkan (2011) claim that innovation has a positive impact on manufacturing firms' performance. Tellis et al. (2009) propose that "radical innovation is an important driver of growth, success, and wealth of firms and nations". Thus, recognizing the key role that innovation plays in firm performance, companies invest significant resources in R&D and NPD.

2.1.2 Innovation Capabilities

In order for innovation to become part of a company's DNA, work has to be done to improve the organization's Innovation Capabilities. For the purposes of this study, the definition by Olsson et al. (2010) is used: "Ability to continuously develop innovations as a response to a changing environment". Some authors separate Innovation Capabilities in two (Liao, Fei, & Chen, 2007; Tuominen & Hyvönen, 2004): technical, which is about developing new products or technology, and managerial, which includes the market and marketing transformation abilities.

Following a literature review on Innovation Capabilities, Saunila (2016) highlights its four key common characteristics:

- Potential or ability to produce innovations;
- Internal capability;
- Requires continuous improvement;
- Aims to add value.

Saunila (2016) also proposes seven determinants of Innovation Capability:

- Leadership culture;
- Work climate and well-being (innovation culture, communication, collaboration, shared values);

- Ideation and organizing structures (rewards, level of decentralisation, cross-functional communication);
- Know-how development;
- Exploiting external knowledge (knowledge of external environment, networking, learning about customers and competitors);
- Regeneration (organizational learning, attitude to risk).

A company's Innovation Capabilities can be a key driver of its success (Kallio, Kujansivu, & Parjanen, 2012). Consequently, Innovation Capability can be viewed as a predictor of firm performance (Saunila, 2016).

2.2 Intrapreneurial Culture

Intrapreneurial Culture is further explored in this section. First, the concept of intrapreneurship is clarified in section 2.2.1. Guiding Question 5 is explored in detail through sections 2.2.2 to 2.2.5. The importance of Corporate Culture in the context of innovation is discussed in section 2.2.2. The specifics of an Intrapreneurial Culture and its key dimensions conducive to innovation are presented in section 2.2.3. The role of managerial practices favorable for intrapreneurship is summarized in Section 2.2.4. To conclude, the characteristics of an Intrapreneurial Culture favorable to the development of Innovation Capabilities are contrasted with those of an execution-oriented culture in section 2.2.5.

2.2.1 Intrapreneurship

According to Hisrich and Kearney (2011), "entrepreneurship is the dynamic process of creating incremental wealth and stimulating the surrounding environment" and is a universal concept that can be applied in organizations of any size and type. Consequently, intrapreneurship can be seen as a sort of entrepreneurship. Indeed, intrapreneurship is referred to by many authors as "corporate entrepreneurship" (CE) (Hisrich & Kearney, 2011; Kuratko & Audretsch, 2013; M. H. Morris et al., 2006).

Definitions of intrapreneurship have varied significantly over the last couple of decades (Kuratko & Audretsch, 2013). In an effort to clarify the domains of intrapreneurship, Kuratko and Audretsch (2013) refer to a categorization by M. H. Morris, Kuratko, and Covin (2010) that first suggests two major categories: corporate venturing (CV) and strategic entrepreneurship. CV can be further

subdivided into internal corporate ventures (ICVs) and external corporate ventures (ECVs), both having in common the creation of new businesses within an established enterprise. On the other hand, strategic entrepreneurship does not necessarily result in the creation of new business and is characterized by a broader variety of formal and informal entrepreneurial initiatives. These initiatives can manifest themselves through different types of innovation, such as strategic, processes, business model, etc., and can occur anywhere in the firm.

In the context of this thesis, a definition of intrapreneurship by Baruah and Ward (2014) is used: "the innovation practice within an organization through which employees undertake new business activities and pursue different opportunities". This thesis focuses primarily on strategic entrepreneurship. While there are many similarities and some differences between intrapreneurship in established organizations and entrepreneurship that implies the creation of a completely new business, the essence of the entrepreneurial spirit behind both is the same (Hisrich & Kearney, 2011). Thus, in this thesis, entrepreneurship and intrapreneurship, as well as intrapreneurial and entrepreneurial culture and behaviour, are used interchangeably and refer to entrepreneurship within established firms.

2.2.2 Corporate Culture and Innovation

Following a review of a range of definitions, Triandis (1996) found that most researchers agree that corporate culture is reflected in shared cognitions. "Corporate Culture has more to do with the mind than with the organizational chart" (Thomas J. Peters as cited in Kuratko, Hornsby, Naffziger, and Montagno (1993)). Katzenbach and Harshak (2011) describe corporate Culture as "deeply embedded, self-reinforcing behaviours, beliefs and mind-sets that determine 'how we do things around here'" and claim that it has a significant impact on the firm's actions and performance. Indeed, the company's identity is grounded in its culture (Katzenbach & Harshak, 2011). In this study, a definition by Tellis et al. (2009) that views Corporate Culture as "a core set of attitudes and practices that are shared by the members of the firm" is used.

Following a study of 759 firms across 17 major nations including Canada and USA, Tellis et al. (2009) claim that corporate culture is the strongest driver of radical innovation across nations compared to a number of factors such as R&D spending, patents and firm size. Investment in skilled labour was the second strongest driver in this research. Some studies suggest that companies with

strong and inspiring cultures, such as Procter & Gamble, Apple and Starbucks, have a better financial performance (Katzenbach & Harshak, 2011).

Following a systematic literature review of over 100 papers, Smith, Busi, Ball, and Van Der Meer (2008) claim that organizational culture both impacts and is impacted by all other factors that influence a company's ability to manage innovation. Among the determinants identified by Saunila (2016), work climate and well-being, as well as leadership culture, are considered to be the first aspects to work on in order to improve a company's Innovation Capabilities. According to Ballé, Morgan, and Sobek II (2016) learning is central to sustained innovation.

Rao and Weintraub (2013) believe that an innovative company culture is based on six interrelated building blocks. Three of the six blocks are more tangible and easy to measure: resources, processes and success. These are often more attractive to managers aiming to rejuvenate their firm's innovative capabilities. The other three blocks are values, behaviour and climate. They are more human-centered and intangible, and thus more difficult to measure. These blocks are more often neglected as managers tend to be less confident in navigating through these human aspects. As Rao and Weintraub (2013) put it "the soft stuff is the hard stuff". However, it is these 'people issues' that "have the greatest power to shape the culture of innovation and create a sustained competitive advantage" (Rao & Weintraub, 2013).

Based on these blocks, the authors propose an Innovation Quotient (IQ) questionnaire to help companies evaluate how innovative their culture is and to better understand their strengths and weaknesses regarding innovation. Over three years, this test has been administered to 1,026 managers at 15 companies of diverse industries and geography. While there is no perfect score, Rao and Weintraub (2013) believe that truly innovative companies are very strong in at least one of the building blocks.

According to Katzenbach and Harshak (2011), the best way to diagnose a corporate culture is by looking closely at the employees' behaviours. Rao and Weintraub (2013) believe that employees' behaviours are the result of a company's values, which show through the actions and investments of its leaders much more than on official company value statements. The company's values also impact people's definition of success (Rao & Weintraub, 2013).

2.2.3 Intrapreneurial Culture and Innovation

Intrapreneurship can be viewed as “the sum of a company’s innovation, renewal, and venturing efforts” (Zahra, 1995). A number of scholars view innovation as a form of intrapreneurship (Ireland et al., 2009; Schumpeter, 1934). While definitions of both innovation and intrapreneurship vary significantly in literature, innovation is always a significant part of intrapreneurship and, according to Covin and Miles (1999), is the single common element across intrapreneurial firms.

Although some scholars may use the notions of innovation culture and intrapreneurial culture interchangeably, an explicit choice to study intrapreneurial culture and not innovation culture was made for this study. In fact, a high-tech environment or an SME based on the inventiveness of its founder could have a strong innovation culture without necessarily having the other characteristics necessary to make it intrapreneurial, such as proactivity, risk taking and future orientation. An Intrapreneurial Culture is thus defined in this study as *an environment where each employee can seize the opportunity to put to work their intrapreneurial potential*.

According to Covin and Slevin (1991), for a firm to be considered intrapreneurial, it must simultaneously exhibit a certain level of each of the three components of what Miller (1983) calls the “Entrepreneurial Orientation” (EO): innovativeness, risk-taking and proactivity. Dynamism, flexibility and opportunism are also characteristics often attributed to intrapreneurial firms (Kuratko, Hornsby, & Goldsby, 2012). Such companies encourage creativity, risk-taking and teamwork (Kuratko et al., 1993), and focus on managing uncertainty, empowering employees and encouraging experimentation (M. H. Morris et al., 2006). According to Kuratko, Hornsby, and Covin (2014), “corporate entrepreneurship flourishes in established firms when individuals are free to pursue actions and initiatives, regardless of the ‘rules’”.

Kuratko, Hornsby, et al. (2014) have identified five key dimensions for a corporate environment favourable to intrapreneurship: (1) top management support, (2) work discretion/autonomy, (3) rewards/reinforcement, (4) time availability, and (5) organizational boundaries. The firms that score higher on these dimensions have a better chance of successfully implementing an innovative strategy (Hornsby, Kuratko, & Zahra, 2002; Ireland, Kuratko, & Morris, 2006). Moreover, findings by Hornsby, Kuratko, Shepherd, and Bott (2009) show that 3 of the 5 dimensions (management support, rewards/reinforcement and discretion/autonomy) (Kuratko, Hornsby, et al., 2014) are significantly correlated with the quantity of ideas implemented.

Numerous studies have shown a positive impact of intrapreneurship on financial as well as non-financial corporate performance (Covin & Slevin, 1989; Davis, Morris, & Allen, 1991; Wiklund & Shepherd, 2005; Zahra, Jennings, & Kuratko, 1999). Several authors believe that in today's globalization context, intrapreneurship is essential to innovation (Gómez-Haro, Aragón-Correa, & Cordón-Pozo, 2011) and is the best path to high organizational performance (Garvin & Levesque, 2006; Kuratko, 2009; M. H. Morris et al., 2010).

2.2.4 Role of Management Practices in Intrapreneurship

Management practices have a "direct and significant impact on the performance of both the breakthrough initiative and the traditional business" (O'Reilly III & Tushman, 2004). Each managerial level has a distinct role to play in strategic renewal of organizations (Floyd & Lane, 2000).

According to Burgelman (1984), one of the main roles of senior-level managers is to structure the organization so it encourages and allows intrapreneurship. Moreover, a study of transformational Chief Executive Officers (CEOs) of 152 firms by Ling, Simsek, Lubatkin, and Veiga (2008) suggests that CEOs have a significant role in shaping top characteristics required of top management in order to create an intrapreneurial culture.

The role of middle-level managers is often one of "change agents and promoters of innovation," connecting ideas and strategies with the right people (Kuratko & Audretsch, 2013). They are often the champions who nurture intrapreneurial initiatives as well as guide and support intrapreneurs through organizational structure and obstacles (Kuratko & Audretsch, 2013). Doing so might require redirecting resources from day-to-day operations toward intrapreneurial initiatives with a higher potential strategic fit (Burgelman, 1984; Ren & Guo, 2011). In order to accomplish this, they must have enough discretionary decision-making power which in turn requires a certain level of decentralization. According to Kuratko and Audretsch (2013), the "middle management level is where entrepreneurial opportunities are given the best chance to flourish".

Based on the model by Floyd and Lane (2000), first-level managers have experimenting, adjusting and confronting roles. Kuratko et al. (1993) suggest that corporate managers must adapt their approach to manage intrapreneurs differently from traditional employees. The authors add that some traditional management approaches can discourage potential intrapreneurs from engaging in

Intrapreneuring. Sykes and Block (1989) propose a list of traditional management practices that are detrimental to an intrapreneurial culture.

While several studies suggest that higher managerial levels have increasingly superior structural ability to implement and support intrapreneurial efforts (Burgelman, 1983a, 1983b, 1984; Hornsby et al., 2009; Hornsby et al., 2002), a joint effort from all managerial levels is key to developing entrepreneurial behaviours necessary to drive the company's future success (Kuratko, Hornsby, & Bishop, 2005).

2.2.5 Intrapreneurial vs Execution-oriented Culture

There is no consensus as to whether intrapreneurship and bureaucracies are polarities that cannot coexist within the same organization (Duncan, Ginter, Rucks, & Jacobs, 1988). While some authors think that intrapreneurship within a bureaucratic organization is impossible (Morse, 1986), others believe it can be achieved within companies of any type and size (Burgelman, 1984; Kuratko & Montagno, 1989). Some even argue that the coexistence of both is absolutely necessary (Kanter, 1985). Kuratko et al. (1993) describe a culture that encourages innovation as one of "entrepreneurs and designers" while the typical culture in established companies as one of "bureaucrats and controllers". T. E. Brown, Davidsson, and Wiklund (2001) highlight that entrepreneurial and administrative behaviours vary in the ways managers approach opportunity and manage resources. The authors also highlight differences in the company structures and the design of reward systems. A few examples of established companies that have been successful with Intrapreneuring are 3M, IBM, Hewlett-Packard, General Electric and Polaroid (Kuratko et al., 1993).

According to O'Reilly III and Tushman (2004), few companies are successful at balancing their existing products and operations with innovating and preparing for the future. By examining those who are, the authors discovered the ambidextrous organizations which separate their exploitative and explorative units with different processes, structures and cultures. However, a close link between both units at the senior executive level is paramount, with senior teams and managers ensuring synergy across the different parts of the organization and capitalizing on shared resources (O'Reilly III & Tushman, 2004). All this is done with clear common organizational objectives in mind. The ambidextrous organizations were considerably more successful at launching breakthrough products or services. The ambidextrous organizational design was also the best at

keeping or increasing the performance of the companies' existing products compared to functional designs, cross-functional teams or unsupported teams.

Table 2.4 summarizes the key characteristics of an Intrapreneurial Culture that make it favorable to innovation as reviewed in the literature. This table helps better establish what defines an Intrapreneurial Culture while not being part of an execution-oriented one.

2.3 Performance Measurement Systems

Saunila and Ukko (2013) claim that measurement can help improve Innovation Capabilities. However, "the role of performance measurement in developing innovation capability is […] ignored in the current literature", especially for SMEs (Saunila, 2016).

Cook, Vansant, Stewart, and Adrian (1995) define performance measurement as "the periodic measurement of progress towards explicit short and long-run objectives and the reporting of the results to decision makers in order to attempt to improve program performance". A key goal of performance measurement is to minimize the gap between intention and outcome (Loch, Stein, & Terwiesch, 1996). In this study, the definition of PMS by Neely et al. (2000) is used: "a balanced and dynamic system that is able to support the decision-making process by gathering, elaborating and analysing information".

This section first clarifies the meaning and functions of PMS in sections 2.3.1 to 2.3.3. An overview of the control function is presented in section 2.3.1. Section 2.3.2 dives into the possible functions of a PMS. An overview of the general history and evolution of PMS and their key perspectives is presented in section 2.3.3. GQ 3 is explored in section 2.3.4 that covers the specifics of PMS more appropriate to measure innovation. The challenges and particularities of PMS in SMEs are discussed in section 2.3.5 as it was assessed that the Company exhibits some SME characteristics. Consequently, it was relevant to identify how such characteristics may influence performance measurement. Follows an overview of literature on the dynamics of PMS and intrapreneurship in section 2.3.6, contributing to GQs 1 and 4. To conclude, innovation-oriented PMS are compared with execution-oriented ones in section 2.3.7.

Table 2.4: Key Characteristics of an Intrapreneurial Culture making it Favorable to Innovation

Characteristic	References
Proactivity, experimentation and initiatives	Covin and Slevin (1991); Gibson and Birkinshaw (2004); Kuratko (2009); Kuratko, Hornsby, et al. (2014); Miller (1983); M. H. Morris et al. (2006); O'Reilly III and Tushman (2004); Pinchot III (1985); Rao and Weintraub (2013); Wiklund and Shepherd (2005)
Highly valued professional development and continuous learning (individual and organizational)	Ballé et al. (2016); Kuratko et al. (1993); Rao and Weintraub (2013); Tellis et al. (2009), Ries (2011)
Risk taking and risk tolerance	Christensen (1997); Covin and Slevin (1991); Kuratko et al. (1993); Miller (1983); M. H. Morris et al. (2006); Pinchot III (1985); Rao and Weintraub (2013); Tellis et al. (2009); Wiklund and Shepherd (2005)
Informal groups working on initiatives, heavyweight development teams, 'skunkworks'	Christensen (1997); Cirka (1997); Floyd and Lane (2000); Galbraith (1975); Gibson and Birkinshaw (2004); Pinchot III (1985); Clark and Wheelwright (1992); Katzenbach and Harshak (2011); Kuratko et al. (1993)
Reward systems and incentives for intrapreneuring	Christensen (1997); Gibson and Birkinshaw (2004); Kuratko, Hornsby, et al. (2014); O'Reilly III and Tushman (2004); Pinchot III (1985); Tellis et al. (2009)
Future Orientation	O'Reilly III and Tushman (2004); Rao and Weintraub (2013); Tellis et al. (2009)
Empowerment and support of intrapreneurs	Gibson and Birkinshaw (2004); Kuratko, Hornsby, et al. (2014); M. H. Morris et al. (2006); Pinchot III (1985); Rao and Weintraub (2013); Tellis et al. (2009)
Employee Autonomy	Clark and Fujimoto (1991); Kuratko, Hornsby, et al. (2014); M. H. Morris et al. (2006); Pinchot III (1985, 1993); Rao and Weintraub (2013); Shih and Yong (2001); Tellis et al. (2009)
Acceptance of failure	Christensen (1997); Rao and Weintraub (2013); Ries (2011)
Flexibility and dynamism	Covin and Slevin (1991); Gibson and Birkinshaw (2004); Govindarajan (1988); Kanter (1985); Kuratko et al. (2012); Marginson (2002); Pinchot III (1985); Rao and Weintraub (2013); Ries (2011)
Innovativeness and creativity	Covin and Miles (1999); Covin and Slevin (1991); Ireland et al. (2009); Kuratko et al. (1993); Miller (1983); M. H. Morris et al. (2006); Schumpeter (1934); Wiklund and Shepherd (2005); Zahra (1995)
Opportunism	Kuratko et al. (2012); Pinchot III (1985)
Dedicated resources (time, money, space)	Kuratko, Hornsby, et al. (2014); Pinchot III (1985); Rao and Weintraub (2013)

2.3.1 Control Function

Typically, a company's control systems are very simple and often informal in the beginning (M. H. Morris et al., 2006). The controls and their effect on the organizational culture are impacted by the company's size (Greiner, 1972; M. H. Morris et al., 2006). With the company growing, the "control practices arise from conscious managerial efforts as well as informal mechanisms that emerge through the spontaneous interactions of employees over time" (M. H. Morris et al., 2006). All this materializes in a complex web of items that are sometimes counterproductive as they were created to address different needs (M. H. Morris et al., 2006). Moreover, formalization comes into play and the control systems become more complex, eventually getting to the point where they encourage bureaucracy and micro-management (Shih & Yong, 2001). Departments develop their own identities, make their own decisions and develop their own controls (M. H. Morris et al., 2006), contributing to the creation of silos. Sometimes the control systems even become an end in themselves thus resulting in employees' distrust (Morrow, Hansen, & Pearson, 2004). Operational efficiency becomes more important than strategic effectiveness (Simons, 1995). This becomes the new company culture and the bigger the organization is, the more resistance there will be to change this culture moving forward (Katzenbach & Harshak, 2011).

The key purposes of the control function are to reduce the risks associated with uncertainty, support efficient execution of established routines and standardize (Goodale et al., 2011). Consequently, they are generally designed for high efficiency, conformance, reduced risk and uncertainty, as well as promotion of standards and specific roles (M. H. Morris et al., 2006). However, according to Govindarajan (1988), as tasks vary in uncertainty they require different behaviours for an effective performance. According to Galbraith (1975), uncertainty limits the effectiveness of formal control systems. Hence, because the control systems have an impact on employees' behaviours, they must be tailored to task uncertainty (Govindarajan, 1988). While various researchers proposed different definitions of the elements that constitute control systems (M. H. Morris et al., 2006), performance measurement is always a part of controls.

According to Pinchot III (1993), bureaucracies were a suitable form of organization in an industrial age when the aim was to exploit economies of scale with well-delimited areas of responsibility and functional specialization. However, in an era with a greater need for self-determination, he calls for an 'intelligent organization' based on self-management and flatter structures. M. H. Morris et

al. (2006) add that control systems must adapt to this new reality. According to the contingency theory, with increasing uncertainty and a more complex environment, the appropriate organizational structures and controls will be different (M. H. Morris et al., 2006).

Cirka (1997) puts control strategies in three categories based on what they do: (1) regulate the organization's inputs; (2) govern employees' behaviours; or (3) measure achievement and outputs. According to M. H. Morris et al. (2006), "the implementation of measures […] brings order, coordination, accountability and efficiency to an otherwise chaotic situation".

2.3.2 Functions of PMS

PMS are mainly studied from either the accounting or the operational point of view (Garengo, Biazzo, & Bititci, 2005). Kerssens-van Drongelen (1999) identified seven possible PMS functions:

- Provide insight into deviations of performance from objectives to allow management to decide if steering measures are necessary;
- Provide insight into deviations of performance from objectives to allow staff to decide if steering measures are necessary;
- Fuel learning on the system that is being controlled to enable better planning and control in the future;
- Facilitate alignment and control of objectives;
- Support decision making regarding performance based rewards;
- Provide input to support and justify decision making;
- Motivate employees through feedback.

In sum, the high level purpose of measurement is either to encourage desired behaviour or limit unwanted behaviour (M. H. Morris et al., 2006). When the purpose of measurement is not well understood by the employees, it appears to them as a distraction from their work on what they believe being the company's goals (Neely et al., 2000).

According to Bititci, Turner, and Ball (1999), while a PMS should be dynamic, most companies use static models. Indeed, the managers are too often not capable of distinguishing measures necessary for control from measures useful to support improvement, or do not understand the complex causal relationships between high level strategy and everyday action (Bititci et al., 1999).

2.3.3 Overview of PMS History

PMS were originally used to evaluate the achievement of specific, most often financial, goals (Neely et al., 1997). The PMS models used accounting and financial metrics as they were originally under the control function (Bremser & Barsky, 2004; Kaplan & Norton, 1992; Neely et al., 2000). Performance measurement is still most often nested under the finance function (Bremser & Barsky, 2004), even to measure innovation.

In the 1980s, executives' dissatisfaction with the short-term focus of financial measures resulted in the addition of operational metrics (Kaplan & Norton, 1992) as well as an interest to measure success through customer satisfaction and human capital perspectives (Jiménez-Zarco et al., 2006). In the information economy, companies rely more and more on resources that are difficult to measure (Bremser & Barsky, 2004). Some authors even argued that senior managers should not be looking at the business from a financial perspective anymore as it is by taking care of the other, often softer aspects of the business that the financial results will follow (Kaplan & Norton, 1992). Consequently, senior management as well as other functions than finance started to get involved in PMS (Jiménez-Zarco et al., 2006; Kaplan & Norton, 1992; Neely et al., 2000).

Kaplan and Norton (1992) believed that while financial measures were appropriate during the industrial era, a more balanced approach of looking at a company's performance was needed going forward. They proposed the most popular model in practice and in literature (Garengo et al., 2005). The Balanced Scorecard (BSC) aims to help managers balance four key business perspectives: the customer, the internal business, the innovation and learning, and the financial perspectives. These perspectives are meant to allow for balance between short-term and long term objectives, between outcomes and their drivers, as well as between hard and soft measures (Kaplan & Norton, 1996). The Company's strategy is transformed into specific measurable objectives that are cascaded down through the hierarchy and is ultimately reflected in the employees' performance evaluations (Bremser & Barsky, 2004; Kaplan & Norton, 1996).

In their comparison of six of the most popular generic models as well as two models developed specifically for SMEs since the nineties, Garengo et al. (2005) observed an evolution from bureaucratic systems to more reactive ones. They also perceived a slight decrease in the importance of strategic alignment as well as a growing importance of the stakeholder perspective in the PMS design over time.

2.3.4 Overview of PMS to Measure Innovation Performance

"What you measure is what you get" (Kaplan & Norton, 1992). According to Kuratko, Covin, et al. (2014), the absence of a PMS can jeopardize the success of innovation projects. A company cannot be sure to detect poor performance and take appropriate corrective actions in the areas that do not have performance indicators (Busby & Williamson, 2000; Godener & Soderquist, 2004).

However, the evolving and dynamic nature of innovation makes its performance measurement a significant challenge (Kirchhoff, Linton, & Walsh, 2013). It requires connecting past cost data with potential future long-term results (Bremser & Barsky, 2004). Indeed, R&D activities have to be continuous and coherent over the long term, at least 5 years, for R&D results to be meaningful (Lazzarotti, Manzini, & Mari, 2011). In addition, the idiosyncratic nature of innovation makes it difficult to compare innovation performance with competitors (Sawang, 2009).

Moreover, there is a gap between IPMS proposed in the literature and what is required to fulfill the needs of innovative firms (Dewangan & Godse, 2014). Ojanen and Vuola (2005) claim that "it is absolutely essential to clarify the main purpose of the innovation control system". Furthermore, while there is a general agreement on the need of a multi-dimensional approach to measure innovation performance, there is little consensus on the dimensions to use (Dewangan & Godse, 2014).

2.3.4.1 Areas of Innovation Performance Measurement

Based on a literature review, Godener and Soderquist (2004) identify seven complementary areas of what they call R&NPD (Research and New Product Development) performance measurement:

1. Financial performance measurements;
2. Customer satisfaction measurements;
3. Process management measurements;
4. Innovation measurements;
5. Strategic measurements;
6. Technology measurements;
7. Knowledge management measurements.

The first four are very close to the four BSC perspectives as well as to the categories identified by Griffin and Page (1996) during their survey of measures used in practice (Godener & Soderquist, 2004). The customer satisfaction measurement is one of the main dimensions of contemporary PMS models according to a number of authors (Garengo et al., 2005). Atkinson, Waterhouse, and Wells (1997) state that to perform, a company must know its stakeholders' expectations. According to a study on the effectiveness of R&D performance measurement, Kerssens-van Drongelen and Bilderbeek (1999) claim that customer focus might be the most important characteristic that distinguishes effective PMS.

Following an extensive literature review, Werner and Souder (1997) favour the aggregation of quantitative and qualitative measures for a collective R&NPD performance measurement by R&D, marketing and planning. Furthermore, Jiménez-Zarco et al. (2006) state that the measures must indicate the future potential of the innovation endeavours and anticipate the market needs and preferences.

Several authors support that innovation performance measurement is idiosyncratic to the company's and project's contexts (Bremser & Barsky, 2004; Brophey, Baregheh, & Hemsworth, 2013; Brophey & Brown, 2009; Godener & Soderquist, 2004; Griffin & Page, 1996; Jiménez-Zarco et al., 2006). Consequently, the most appropriate innovation measures are not always the same ones. Following a study of IPMS literature, Dewangan and Godse (2014) propose five guiding principles for the development of an effective performance measurement system:

- Multi-dimensional (financial and non-financial, hard and soft measures, leading and lagging indicators);
- Measuring performance of various stages within the innovation cycle;
- Addressing organizational stakeholder goals;
- Supporting a cause and effect relationship;
- Easy to implement and use (aligned with existing PMS and cascaded through various hierarchical levels).

2.3.4.2 Review of the Gaps between the Popular Metrics and the Useful Ones

Godener and Soderquist (2004) regrouped the possible uses of R&NPD performance measurement from literature into five categories:

1. Communication of objectives, agreements and rules;
2. Definition of corrective actions based on diagnosis and control;
3. Resource allocation;
4. Decision making on individual rewards and incentives;
5. Learning and continuous improvement.

Following an extensive review covering 40 years of literature, Werner and Souder (1997) purport that the most complex metrics, which are also more costly to develop and use, are often the most useful ones. Based on a survey of NPD practitioners that is known as 'the definitive cataloguing of success metrics' , Griffin and Page (1993) found that there was little overlap between the measures used and those that the practitioners believed would be more useful. When asked why they would not measure what they believe would be useful to measure, the managers' answers were as follows (Griffin & Page, 1993):

1. Lack of appropriate systems in place (37% of respondents);
2. Company culture does not support measuring (17%);
3. No one is held accountable for the results (12%);
4. Short-term orientation (10%);
5. Lack of understanding of the development process (10%);
6. No time to measure (8%);
7. Measuring is unimportant (6%).

Jiménez-Zarco et al. (2006) suggest the use of the BSC approach to measure performance at the various stage-gate steps by adapting the indicators for each stage. They suggest adding the following four perspectives to the initial perspectives proposed by Kaplan and Norton (1992): market, competence-based criteria, product and marketing. While many authors think that the BSC can be used for innovation performance measurement (Bremser & Barsky, 2004; Gama, Silva, & Ataíde, 2007; Kerssens-van Drongelen & Bilderbeek, 1999; Kerssens-van Drongelen, Nixon, & Pearson, 2000), some scholars question the effectiveness of this model to assess innovation performance, in particular for smaller firms (McAdam, 2000; Oriot & Misiaszek, 2012). According to McAdam (2000), the BSC reduces the flexibility necessary for SMEs.

There is no consensus among scholars (Jiménez-Zarco et al., 2006) nor practitioners (Griffin & Page, 1993; Griffin & Page, 1996) on the choice of model of measurement nor the success innovation dimensions to use. Indeed, Griffin and Page (1996) found over 75 measures in use for product development success with little consensus on which are the most useful (Griffin & Page, 1993). The authors believe that the most appropriate measures of product development success depend on the company's strategy and consequently may vary for different types of development projects (new to the world vs product line extension, etc.) (Griffin & Page, 1996). According to Griffin and Page (1993), three independent dimensions make up NPD project success: consumer-based, financial and technical or process-based. They claim that a perfectly successful project on all three dimensions does not exist (Griffin & Page, 1996).

Donnelly (2000) documented the most used R&D performance measures. However, the most popular measures are not always well integrated with the company's strategy and in 40% of the cases the new products do not achieve the desired results (Donnelly, 2000). While the most popular measures of new product success are financially-based indicators (Jiménez-Zarco et al., 2006), there is no evidence of their usefulness for innovation decision-making (Godener & Soderquist, 2004). Following an investigation of UK service firms, Storey and Kelly (2001) found that financial measures are mostly used by less innovative firms while the 'truly' innovative ones favour soft indicators to measure performance. The customer-focused indicators are often used by the fast-followers (Storey & Kelly, 2001). Kaplan and Norton (1992) believe that a holistic approach to a company's performance is important to prevent sub optimization.

2.3.5 PMS in SMEs

Following a literature review on performance measurement within manufacturing SMEs, Garengo et al. (2005) highlight three aspects differentiating small and large firms: uncertainty, evolution and innovation. They identified five common characteristics of performance measurement in SMEs:

- It is difficult to involve SMEs (especially their top managers) in a performance measurement project and make sure they carry it out to completion due to a lack of time available for non-operational activities.
- Most SMEs either do not use a performance measurement model or use it incorrectly by not properly adapting it to their specific context – they do not take the time to fully understand the implications of the model they choose and of the adaptations they make.

- SMEs lack a holistic approach to performance measurement implementation – they often focus on operational and financial perspectives.
- Performance measurement is often informal and poorly aligned with strategy (Chennell et al., 2000). In addition, it often focuses on control of past activities much more than on forecasting future processes.
- Limited data analysis resources add to the ambiguity of measures which results in low data legitimacy.

All these conditions were experienced at the Partner Company. Garengo et al. (2005) also compiled the characteristics of SMEs that can be obstacles to the successful implementation of PMS:

- Lack of human resources;
- Low managerial capacity;
- Limited capital resources;
- Reactive approach;
- Tacit knowledge and low formalization of processes;
- Misconception of performance measurement.

All these obstacles were also experienced at the Partner Company.

Many authors highlight the importance of PMS for SMEs to be simple (M. G. Brown & Svenson, 1988; Garengo et al., 2005; Laitinen, 1996, 2002; Neely et al., 1996) in order to provide focused, useful and easy to understand information. Indeed, SMEs often do not have the resources to implement and use complex models (Garengo et al., 2005; Laitinen, 1996; McAdam, 2000). It is however paramount to ensure that the simplicity of the PMS is not done at the expense of its completeness (McAdam, 2000) and usefulness (Werner & Souder, 1997). This is a challenging task in the context where a PMS for SMEs should support uncertainty, risk management and innovation processes (Garengo et al., 2005).

An additional challenge to performance measurement of innovation activities in SMEs is the fact that the innovation activities and resources often cross the boundaries of conventional R&D and NPD teams and are dispersed within the company (Lazzarotti et al., 2011), as it was the case at the Partner Company. The PMS must be dynamic and flexible to respond to the needs of SMEs (Garengo et al., 2005). Finally, Greatbanks and Boaden (1998) claim that SMEs often do not understand their own success factors and have poor strategic planning.

2.3.6 PMS and Intrapreneurial Culture

As intrapreneurship is not fundamentally "focused, cumulative, productive, or strategically relevant", an intrapreneurial environment in itself does not guarantee superior innovation and firm performance (Goodale et al., 2011). This supports the need for adequate operations control mechanisms to ensure that intrapreneurship is indeed contributing to the company's goals and future. Several authors argue that control systems provide guidance and direction to the company's innovation efforts thus contributing to higher effectiveness (Kuratko, Covin, et al., 2014; Marginson, 2002). On the other hand, control systems can inhibit employee creativity and intrapreneurial efforts (Christensen, 1997; M. H. Morris & Kuratko, 2002; Pinchot III, 1985; Shih & Yong, 2001). Moreover, the introduction of an innovation PMS can become a significant cultural challenge (Kerssens-van Drongelen & Cooke, 1997). According to Kuratko, Hornsby, et al. (2014), a company that wants to develop an environment conducive to intrapreneurship must strive to measure the dimensions associated with an innovative environment.

Covin and Slevin (2002) see operations control systems as part of the organization's 'hardware' from "which individuals take their behavioural cues". Such systems have an impact on employees' behaviours and can either favor or impede innovation efforts and intrapreneurship. Consequently, a good alignment of operations controls with an intrapreneurial strategy is required for successful innovation (Goodale et al., 2011; Ivanov & Avasilcăi, 2014). Hornsby et al. (2009) add that individual evaluation and reward systems must be aligned with an innovation strategy. This is consistent with numerous researchers who support the importance of the role of control systems in innovation success (Das & Joshi, 2007; Khazanchi, Lewis, & Boyer, 2007; Naveh, 2007).

2.3.7 Innovation-oriented vs Execution-oriented PMS

While traditional PMS mostly focus on financial performance and operational efficiency (Kaplan & Norton, 1992), such indicators are not adequate for innovation performance measurement that requires a focus on more intangible aspects (Gama et al., 2007; Kaplan & Norton, 2001) and on continuous improvement (Dewangan & Godse, 2014). According to Covin and Slevin (1991), higher levels of entrepreneurship are associated with control systems that focus on results rather than processes, and that are more informal and loose. M. H. Morris et al. (2006) refer to 'freedom within a framework' (Collins, 2001) and 'opportunistic flexibility' to advocate for a good balance

of ‘loose-tight’ properties (Peters & Waterman, 1982) within control systems encouraging innovation in established organizations.

As M. H. Morris et al. (2006) nicely put it: controls “are a reflection of human nature” as their design reflects the nature of management and their assumptions on the nature of employees. The authors believe that in order to align the goals of the employees with those of the organization, self-control and social control play a more important role than procedure control (M. H. Morris et al., 2006). Hence, they highlight the importance of informal control mechanisms in complex settings requiring intrapreneurial and operational coexistence. Their research confirms that control systems have a non-linear impact on intrapreneurship in organizations. M. H. Morris et al. (2006) add that when controls focus on efficiency and micro-management, they can become a major obstacle to intrapreneurship. The authors explain that theoretically, “control systems are designed in a manner that facilitates effective outcomes, where these outcomes include risk reduction, elimination of uncertainty, highly efficient operations, goal conformance, and specific role definitions”.

Moreover, Kaplan and Norton (1992) believe that strategy and vision – not control – are at the center of IPMS. This is coherent with Hitt, Hoskisson, Johnson, and Moesel (1996) who conclude that innovative companies favour strategic controls over financial ones. Following an investigation on the use and desired use of measures to evaluate NPD success within practitioners, Griffin and Page (1996) found that while the firms with the most innovative strategies focus on measures of recent and future company growth, those with the least innovative strategies choose metrics more oriented toward efficiency.

Tellis et al. (2009) found a positive relationship between radical innovation and R&D activities. Indeed, one approach to R&D performance evaluation is to look at the associated expenditures (Bremser & Barsky, 2004) as they can be a measure of a firm’s commitment to innovation (Tellis et al., 2009). According to Gama et al. (2007), an innovation-oriented PMS would have more indicators regarding the invested resources than traditional PMS that have mostly financial measures. However, inputs such as R&D resources do not guarantee the development of new innovative products (Acs & Audretsch, 1987; Griliches, 1990) nor their commercial success (Tellis et al., 2009; Von Hippel, 2005). Busby and Williamson (2000) add that the typical approach to measuring engineering design by comparing cost and schedule discrepancies has many flaws. It

does not consider product complexity and novelty typical of new designs and thus might be misleading for reporting purposes (Busby & Williamson, 2000).

As such, resource input will only translate into innovation if the right kind of investments are made (Tellis et al., 2009). Indeed, the financial metrics are an indication of past performance while future performance can be predicted by looking at the customer perspective, internal business, and innovation and learning perspectives (Bremser & Barsky, 2004; Kaplan & Norton, 1992). The latter will drive behaviours necessary for innovation such as learning and creativity (Kaplan & Norton, 1992). M. H. Morris et al. (2006) conclude that control systems "can represent a significant obstacle to entrepreneurship in organizations, especially when they focus on efficiency to the exception of effectiveness, encourage micromanagement of resources, and become ends instead of means in terms of their impact on employee behaviour".

This section covered the highlights from literature on what kind of PMS seem more appropriate for innovation. This provides a basis of knowledge for GQ 3 on the type of PMS that are more appropriate to stimulate Innovation Capabilities in an established company. The key characteristics of such PMS are summarized in Table 2.5. Based on this table, innovation-oriented PMS are defined as *PMS that encourage initiatives and continuous learning, and focus on intangible aspects, on objectives, strategy and forecasting future processes.*

Table 2.5: Characteristics of Innovation-oriented PMS

Characteristics	**References**
Encouragement of initiative taking	Jiménez-Zarco et al. (2006)
Focus on intangible aspects	Dewangan and Godse (2014); Gama et al. (2007); Kaplan and Norton (2001); Rao and Weintraub (2013)
Focus on objectives as opposed to results	Kaplan and Norton (1992)
Measurement of employee learning and continuous development	Dewangan and Godse (2014); Jiménez-Zarco et al. (2006); Kaplan and Norton (1992); Ries (2011)
Focus on forecasting future processes as opposed to controlling past activities	Bremser and Barsky (2004); Garengo et al. (2005); Jiménez-Zarco et al. (2006); Kaplan and Norton (1992)
Dynamic and flexible	Marginson (2002); McAdam and Keogh (2004); M. H. Morris and Kuratko (2002); Neely et al. (2000)
Informal and loose	Covin and Slevin (1991); M. H. Morris et al. (2006); M. H. Morris and Kuratko (2002); Pinchot III (1985)
Focus on strategy and vision as opposed to finance and controls	Garengo et al. (2005); Hitt et al. (1996); Kaplan and Norton (1992)

In the context of the innovation KPI development mandate within the Partner Company, it was necessary to start with a good understanding of the key characteristics of an effective PMS. Thus, Table 2.6 presents an overview of such characteristics from the literature review as well as how it applies to the specifics of our Case Study. This summary served as the basis for the KPI choices and propositions.

2.4 Critical Review

This section presents a short summary of the key insights from literature regarding the five Guiding Questions presented in section 1.3 and how they are relevant to the situation at the Partner Company.

> *GQ 1: What are the dynamic relationships and mutual reinforcement mechanisms between a company's Culture and its PMS?*

Control systems have influence on employees' behaviours which in turn contribute to a given Corporate Culture. Consequently, the introduction of innovation PMS in a non-innovative Corporate Culture can present a major cultural challenge (Kerssens-van Drongelen & Cooke, 1997). An attempt to do so resulted in resistance at the partner Company as explained in more detail in Chapter 4. In order to avoid conflicts when asking employees to be innovative, it is important that their performance evaluation and reward systems are aligned with an innovation strategy (Hornsby et al., 2009). This was not the case at the Partner Company. In fact, alignment in general was a major issue during this project as explained in Chapter 4.

> *GQ 2: How do the specific contexts created by the combinations of Culture and PMS influence, improve or deteriorate the company's Innovation Capabilities?*

No literature was found specifically on this triple relationship supporting the relevance of further research on the subject.

Table 2.6: Characteristics of an Effective PMS as per Literature Review

Characteristic	Notes specific to the Case Study Context	References
Aligned with corporate strategy	Particularly important for SMEs as they lack formalized strategy (Garengo et al., 2005) as it is the case at the Partner Company.	Bremser and Barsky (2004); Dewangan and Godse (2014); Garengo et al. (2005); Goodale et al. (2011); Hornsby et al. (2009); Ivanov and Avasilcăi (2014); Jiménez-Zarco et al. (2006); Kaplan and Norton (1996); Kuratko, Hornsby, et al. (2014)
Dynamic and Flexible	Particularly important in a context of change and innovation, as well as in SMEs where innovation is often dispersed throughout the organization (Lazzarotti et al., 2011) as it is the case at the Partner Company.	Bititci et al. (1999); Garengo et al. (2005); Marginson (2002); McAdam (2000); McAdam and Keogh (2004); M. H. Morris and Kuratko (2002); Neely et al. (2000)
Simple	Particularly important for SMEs given limited time and resources (Garengo et al., 2005).	M. G. Brown and Svenson (1988); Dewangan and Godse (2014); Garengo et al. (2005); Laitinen (1996, 2002); Neely et al. (1996)
Useful	More challenging in SMEs, which require simple PMS. According to Werner and Souder (1997), the useful ones are rarely simple.	Godener and Soderquist (2004); Neely (1998); Werner and Souder (1997)
Mix of hard and soft metrics	Soft metrics are particularly relevant in the context of uncertainty (M. H. Morris et al., 2006; Storey & Kelly, 2001).	Dewangan and Godse (2014); Garengo et al. (2005); Govindarajan (1988); Kaplan and Norton (1992); M. H. Morris et al. (2006)
Mix of financial and non-financial indicators	Non-financial indicators are important predictors of success, particularly in the context of innovation as it may take several years before seeing the results (Bremser & Barsky, 2004; Lazzarotti et al., 2011).	Dewangan and Godse (2014); Kaplan and Norton (1992); M. H. Morris et al. (2006)
Short-term and long-term balance	To balance operational performance and future firm success.	Kaplan and Norton (1992)
Balance between outcomes and drivers	To encourage desired behaviours while ensuring that they are delivering expected results.	Kaplan and Norton (1992)
Customer/ stakeholder focus	Necessary for the effectiveness of PMS when measuring innovation performance (Kerssens-van Drongelen & Bilderbeek, 1999).	Atkinson et al. (1997); Dewangan and Godse (2014); Garengo et al. (2005); Kerssens-van Drongelen and Bilderbeek (1999)
Mix of leading and lagging indicators	To better account for past and future performance (Dewangan & Godse, 2014).	Dewangan and Godse (2014); Kaplan and Norton (1992)
Supporting a cause and effect relationship	Helps link intangible and tangible measures to better understand what drives innovation performance (Dewangan & Godse, 2014).	Dewangan and Godse (2014)

GQ 3: What kind of PMS is more appropriate to stimulate Innovation Capabilities in an established company?

There is a gap between the measures proposed in literature and those required to fulfill the needs of innovative firms (Dewangan & Godse, 2014). A review of 40 years of literature by Werner and Souder (1997) suggests that the most useful metrics are often the more complex and more costly to develop and use. This could help explain the gap found by Griffin and Page (1993) between the measures used by the practitioners and those they wish to use. This was seen with the NPD indicators development project at the Partner Company mentioned in section 1.4.3. Moreover, during the author's mandate at the Company it was possible to observe a tendency to favour the simplest and most accessible indicators without questioning their usefulness. In addition, the development of more complex metrics that were believed to be more useful was put on hold or abandoned. While there is no clarity in literature on the most appropriate measures to stimulate Innovation Capabilities, some characteristics of PMS favorable to innovation do emerge, as presented in Table 2.5.

GQ 4: How could PMS reinforce or kill the seeds of the Intrapreneurial Culture needed to foster long-term Innovation Capabilities?

There is a fundamental tension between control systems and intrapreneurship. On the one hand, the control systems aim to optimize, standardize and reduce uncertainty (Goodale et al., 2011). On the other hand, intrapreneurship is all about uncertainty and getting out of the box (M. H. Morris et al., 2006; Wiklund & Shepherd, 2005). While intrapreneurship is closely linked to innovation, intrapreneurship itself does not guarantee successful innovation. This is why a number of authors argue the importance of PMS in guiding innovation efforts towards higher performance (Kuratko, Covin, et al., 2014; Marginson, 2002). However, other authors have shown how PMS can inhibit employees' creativity and intrapreneurship (Christensen, 1997; M. H. Morris & Kuratko, 2002; Pinchot III, 1985; Shih & Yong, 2001).

Hence, some indicators can support intrapreneurship while others can kill it. This is why it can be counterproductive to prioritize whichever measures are readily available or easy to implement as it was done at the Partner Company. Innovation performance measurement is idiosyncratic (Bremser & Barsky, 2004; Brophey et al., 2013; Brophey & Brown, 2009; Godener & Soderquist, 2004; Griffin & Page, 1996; Jiménez-Zarco et al., 2006). Therefore, appropriate indicators for a

given situation must be chosen. Thus, for successful innovation, the controls must be aligned with an intrapreneurial strategy (Goodale et al., 2011; Ivanov & Avasilcăi, 2014). Such a strategy, as well as alignment, were absent at the Company at the time of study.

> *GQ 5: What dimensions of an Intrapreneurial Culture are most important to implement or change in order to stimulate Innovation Capabilities?*

As presented in sections 2.2.2 and 2.2.3, the existing literature supports the importance of the role played by the Corporate Culture in developing Innovation Capabilities. Several dimensions of the Corporate Culture were highlighted as important to develop in order to stimulate Innovation Capabilities:

- Learning (Ballé et al., 2016; Ries, 2011; Saunila, 2016);
- Leadership (Kuratko, Hornsby, et al., 2014; Saunila, 2016);
- Work climate and well-being (Saunila, 2016);
- Work discretion and autonomy (Kuratko, Hornsby, et al., 2014; Saunila, 2016);
- Rewards and incentives (Kuratko, Hornsby, et al., 2014; Saunila, 2016);
- Time availability (Kuratko, Hornsby, et al., 2014; Saunila, 2016);
- Organizational structures and boundaries (Kuratko, Hornsby, et al., 2014; Saunila, 2016).

In addition, key characteristics of an intrapreneurial culture that can stimulate innovation found in literature are presented in Table 2.4.

CHAPTER 3 METHODOLOGY

This study is an in-depth investigation of how organizational culture and PMS influence a company's Innovation Capabilities. Such a subject inspired an iterative research design mainly based on an inductive, theory building approach along with a choice of four different research strategies (Grounded Theory, Intervention Research, Action Research and Case Study) and multiple data collection methods. This type of empirical study cannot serve to test hypotheses and develop generalizable results (Hlady-Rispal, 2016). It allows sense-making and development of propositions or frameworks to be further tested. Each of the research design choices are explained in more detail in this chapter while an overview of the design choices is presented in Table 3.1 along with the references to the relevant sections.

Table 3.1: Overview of the Research Design Choices

Category	Research Design Choices
Research Approach (section 3.1)	Inductive / Theory Building
Research Strategies (section 3.2)	Grounded Theory (section 3.2.1) Intervention-research (section 3.2.2) Action-research (section 3.2.3) Case Study (section 3.2.4)
Research Time-horizon (section 3.3)	Longitudinal Research
Data Collection Methods (section 3.5.3)	Prior Data (section 3.5.3.1) Document Review (section 3.5.3.2) Interviews (section 3.5.3.3) Workshops (section 3.5.3.4) Questionnaire (section 3.5.3.5) Observations (section 3.5.3.6) Meetings (section 3.5.3.7)

The research design is iterative and not fully predictable at the beginning of the study as it depends on how observations and organizational dynamics at each step unfold. While it is impossible to plan this type of research completely, three high-level stages were planned and carried out: Field Preparation, On-site research and Final Analysis. The detailed research steps were adjusted continuously based on ongoing observations and evolved over a continuous interaction between knowledge development and knowledge transfer (see section 1.4.2). Thus, theory and practice flow in parallel with continuous literature review, data collection, and analysis and interpretation feeding one another.

The iterative dynamic and the key research steps are presented in Figure 3.1. Although there were continuous links between literature review, observations, and analysis and interpretations, they are omitted in Figure 3.1 to simplify the visual representation. After each key data collection step, there was continuous observation, and analysis and interpretation. These links were similarly omitted. Re-occurring events such as regular meetings with the IRDT director were not represented on Figure 3.1. Finally, the various colours in Figure 3.1 are used to better distinguish the links.

This chapter details the different research design choices that were made. It begins with the inductive research approach that allows sense-making based on observation in section 3.1. Four appropriate research strategies are then presented in section 3.2 and followed by explanations on the longitudinal time-horizon choice in section 3.3. An overview of the research participants is presented in section 3.4. Finally, all data collection methods used as part of our mixed-model research design are presented in section 3.5.

3.1 Research Approach

As explained in Chapter 1, our research is driven by problems observed in industry. We are interested in an in-depth understanding of complex organizational dynamics. More specifically, we are looking for the best management levers to develop and implement Innovation Capabilities in order to respond to the problems many companies face when they grow and lose their entrepreneurship. The inductive, theory building approach was chosen as it is more appropriate for studies searching to understand complex human interactions as opposed to the deductive, hypothesis testing approach (Saunders et al., 2011). However, this type of empirical study cannot serve to test hypotheses and develop generalizable results (Hlady-Rispal, 2016; Saunders et al., 2011). Instead of validating a theory with data, the inductive approach implies collecting data, often qualitative, to propose theories or frameworks through sense-making. This approach generally implies a more flexible research structure and a close understanding of the research context (Saunders et al., 2011). Moreover, a much larger portion of research on innovation is based on the deductive approach (Hlady-Rispal, 2016). Consequently, there is value in complementing it with insights from a more exploratory and open-ended field research.

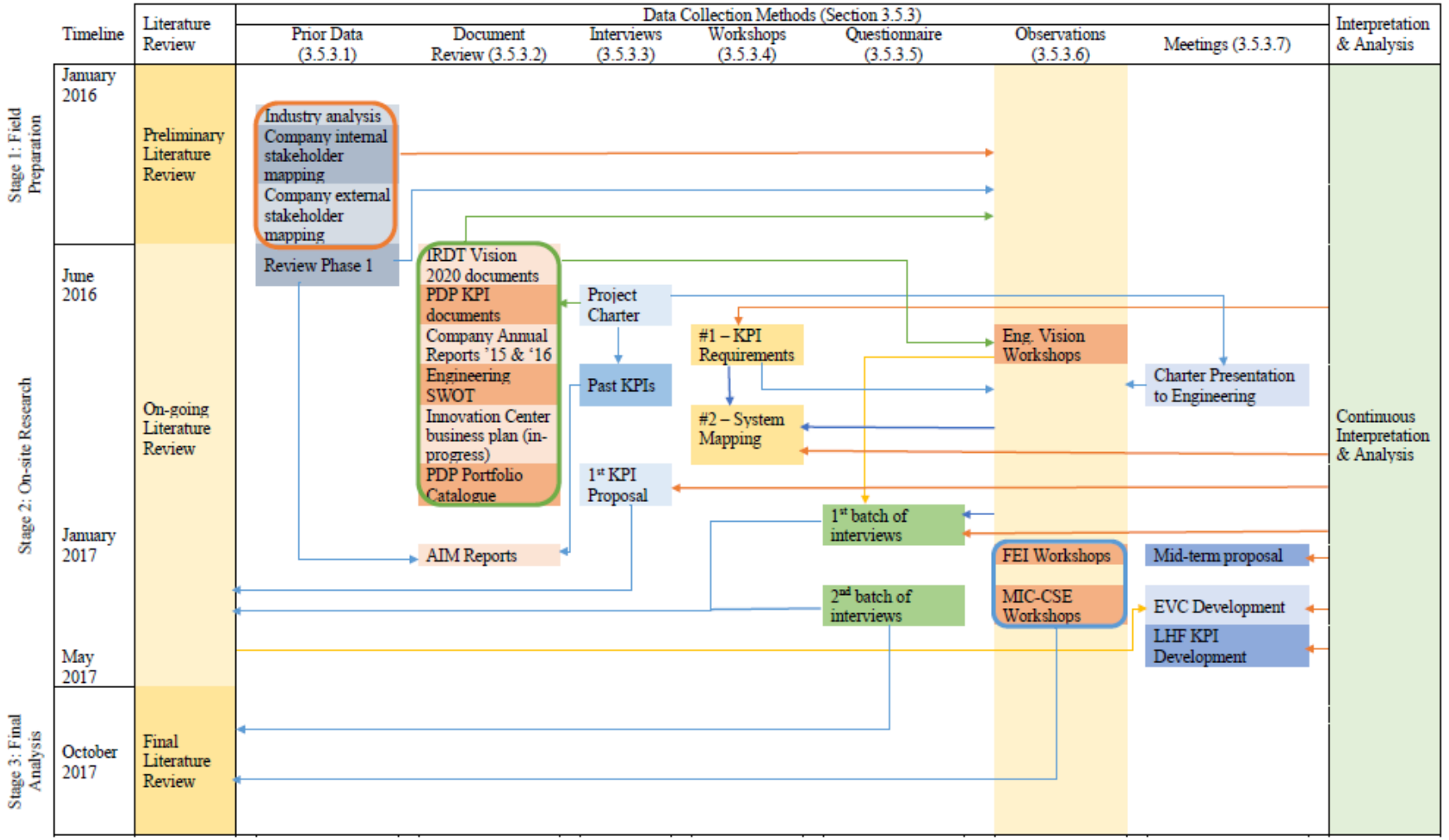

Figure 3.1 Key Data Collection Methods and Research Process Flow

3.2 Research Strategies

A combination of four interrelated research strategies was used for this study and is presented in more detail in the following paragraphs. Saunders et al. (2011) highlight that the strategies are not mutually exclusive and it is possible to use several research strategies as part of one main strategy. The Grounded Theory strategy, presented in section 3.2.1, is the global strategy chosen for this study. It guides the overall iterative data collection and analysis approach, and capitalizes on the observations made through the other research strategies to make sense of how change unfolds in practice. It is used to conceptualize the observations into propositions and a conceptual framework.

The main tactical strategy used is Intervention-research (see section 3.2.2) through the innovation KPI development project at the Partner Company. The Action-research strategy presented in section 3.2.3 and the Case Study strategy presented in section 3.2.4 are the complementary strategies used in this research. An overview of the added value of each of the four research strategies is presented in Figure 3.2.

3.2.1 Grounded Theory

We want to avoid falling into the traps of being limited by existing best practices. The aim is to open ourselves up to potential new knowledge and understanding regarding our research question. **Grounded Theory** is therefore a relevant strategy for this study as it can be used to develop or propose theory based on an interpretative process and analysis of data collected through series of field observations (Saunders et al., 2011). Such a strategy can provide particularly rich results when combined with the three other chosen strategies as the sense making process is based on a deep-dive of the research subject in a specific context.

Suddaby (2006) discusses the common misconceptions about grounded theory. The author highlights that grounded theory is not about the raw data as, contrary to a phenomenological study, the grounded theory researcher is not interested in the specific words and stories. The grounded theory researcher must ‘lift’ the data to a ‘slightly higher level of abstraction’ (Suddaby, 2006). Moreover, grounded theory is not theory testing or content analysis. It is a messy, non-linear interpretative process. Thus, the researcher must develop a ‘feel for their data’ and should treat the process as a highly creative one (Suddaby, 2006).

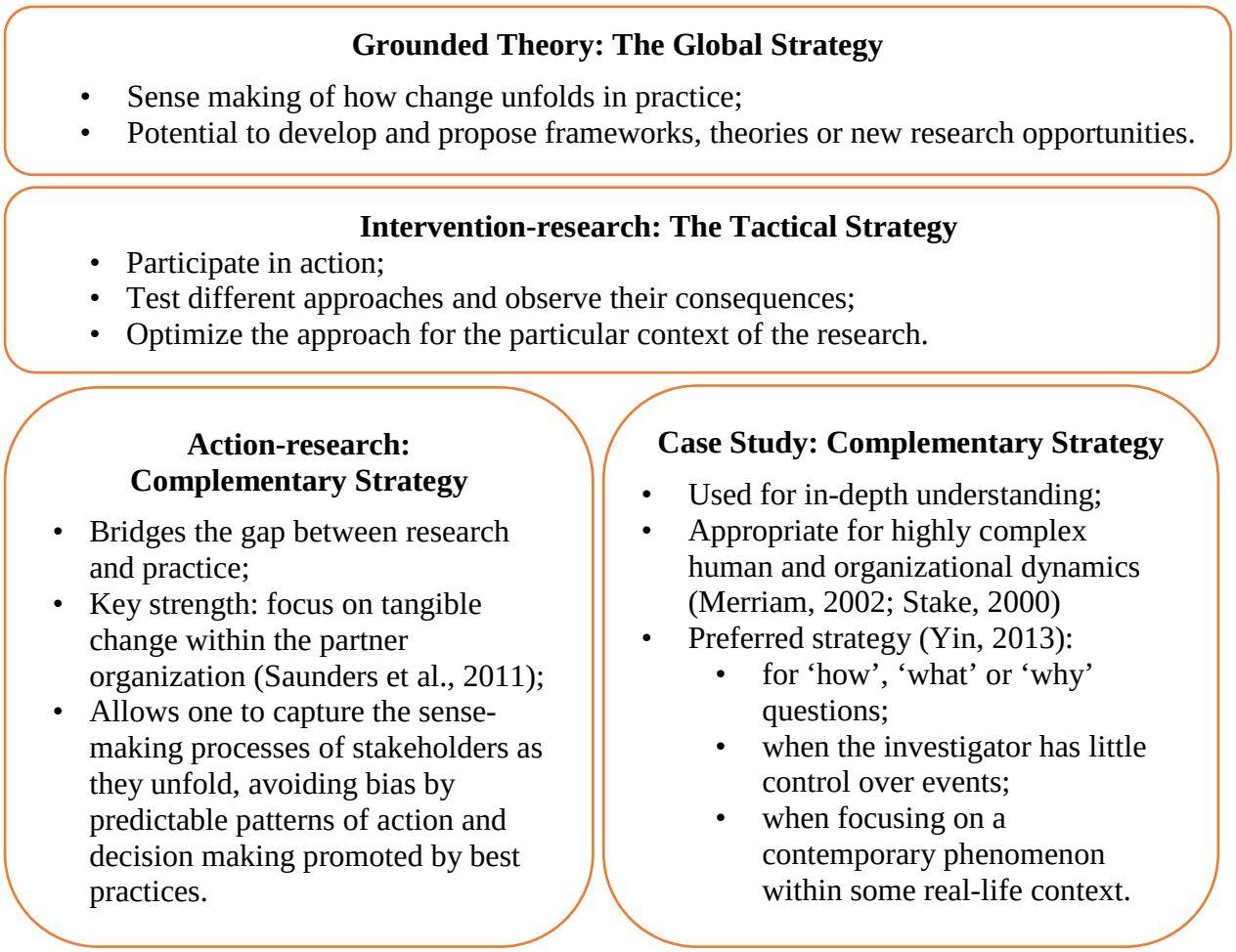

Figure 3.2: Overview of the Added Value of Each of the Four Research Strategies

In grounded theory, data collection, coding, memoing and analysis are a constant iterative process. It begins with open coding. Throughout the comparison of new data with existing and emerging codes, a core category and its closely related categories should emerge. The coding process happens in tandem with memoing, which implies field notes about the data and the conceptual connections between the different categories (Holton, 2010). The goal of memoing is "to develop ideas with complete conceptual freedom" in order to "raise the data to a conceptual level" (Holton, 2010). Holton (2010) explains that the sorting of memos, which also happens continually, generates more memos on higher conceptual levels. "As coding and memoing progress, patterns begin to emerge" (Holton, 2010). The memos are integrated with existing literature related to the emerging theory, generating new memos. This iterative process eventually leads to the materialization of a theory or a conceptual framework.

3.2.2 Intervention-research

Intervention-Research allows the researcher to actively participate in company initiatives and test different approaches to observe the consequences. These conditions give the researcher the opportunity to observe through direct participation in order to understand and analyze in-depth the decision-making and behaviours of innovation stakeholders in diverse functional groups and at various hierarchical levels. The author's intervention was done mainly through the innovation KPI development mandate. This project required several interventions and interactions with multiple innovation stakeholders. These interactions allowed for a better understanding of stakeholders' reactions to new approaches. The data collection methods used in the context of the required interventions were Workshops (section 3.5.3.4), Meetings (section 3.5.3.7) and Observations (section 3.5.3.6).

Moreover, the quality of the intervention-research strategy was highly increased by the richness of the observations possible through full-time action-research. These observations helped design more appropriate and effective interventions. The combination of intervention-research with action-research results in higher interpretation and analysis reliability.

3.2.3 Action-research

At the time of this study, the Company was going through a leadership transition from second to third-generation family members. The analysis of how each generation has influenced the Company's growth and approach to innovation (Hiebl, 2015) suggests that the Company's management approach is anchored in intuitive and emotional management and decision-making styles as opposed to a more rational approach based on management theories (Freel, 2000; McAdam, Keogh, Reid, & Mitchell, 2007; Schmitt et al., 2015). The full-time presence of the author on site for 11 months, allowed for multiple observation perspectives of the change unfolding within the Partner Company beyond the Intervention-research mandate. Thus, following recommendations from past research in this type of context, **Action-Research** was a complementary strategy used in this study through informal observations in the field (Schmitt et al., 2015).

Moreover, we are interested in better understanding how to support organizations in rejuvenating their Innovation Capabilities. Rousseau (2006) speaks of the 'research-practice gap' as the failure

of managers in using management knowledge from research to improve their organizations as well as the difficulties of transferring research findings into the workplace. One way to close the gap is to involve practitioners in the research (Schein, 1999) which can be done by using the Action-research strategy (Saunders et al., 2011).

The resulting observations allow us to capture the very personal sense-making processes of stakeholders as they unfold. Such an approach helps avoid bias by predictable patterns of action and decision making like the ones promoted by best practices from the literature. One of the key strengths of the action-research strategy is its focus on tangible change within the partner organization (Saunders et al., 2011). The data collection methods used as part of this strategy are Interviews (section 3.5.3.3), Questionnaire (section 3.5.3.5) and Observations (section 3.5.3.6).

3.2.4 Case Study

According to T. Morris and Wood (1991), the **Case Study** strategy is particularly relevant when the researchers seek to obtain a deep understanding of the processes being enacted within a specific research context. Yin (2013) claims that the “case study is the preferred strategy “when ‘how’, ‘what’ or ‘why’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context”. This is the case of our study as the RQ and GQs are ‘how’ or ‘what’ questions that are investigated within a real enterprise. The Case Study was also chosen as a complementary strategy, since the study is based on a single company.

Other authors support the use of the case study strategy for research into highly complex human and organizational dynamics (Merriam, 2002; Stake, 2000) as is the case with the development of Innovation Capabilities within an established company. A Case Study strategy implies the use of a combination of several data collection techniques and therefore requires triangulation (Saunders et al., 2011).

3.3 Research Time-horizon

Our research group is interested in studying how organizational dynamics evolve and in understanding the change required to develop better Innovation Capabilities in an established firm. Studying change and development is the main strength of **longitudinal** research (Saunders et al.,

2011). It is thus an appropriate choice, as a significant period of time is necessary to observe and understand the evolution of organizational dynamics at the center of this study (Hlady-Rispal, 2016). Such a methodology requires the researcher to be (Moisdon, 2016; Schmitt et al., 2015):

- present at the Company on a regular basis;
- in direct and frequent contact with the stakeholders;
- an integral member of the innovation team.

The field research presented in this thesis is part of an on-going multi-year action-research program at the Partner Company which began in June 2015 and is still on-going. The researcher was in the field full-time for 11 months, from June 2016 to May 2017, concurrently with two other researchers. While this study is based mainly on the author's field presence during phase II of the longitudinal study, data and research observations from phase I and the beginning of phase III were also used. This provides a better longitudinal perspective than what would normally be possible in 11 months. Table 3.2, adapted from Lakiza and Deschamps (2018), presents the three research phases along with the knowledge development and knowledge transfer focus of each phase. The specific objects of this study are presented in bold in this table.

3.4 Research Participants

In the context of this field study the researcher was working from within the IRDT group under the Engineering department and was given a specific mandate by the IRDT Director, who reports directly to the VP of Engineering. The proximity to different stakeholders throughout the study was accordingly limited based on the position within the Company structure. While the researcher had numerous opportunities to interact with several VPs, she was not in a position to witness firsthand how important innovation is for the executives and how committed they really are to revitalize the Company through innovation.

The researcher's position within the Company's structure also explains the higher number of participants from within the Engineering department. Moreover, as the participation in the study is voluntary, most of the main participants were the people who played an important role in innovation and who were more closely involved with the researcher's mandate within the Company. A few people less involved in innovation but highly interested were also included. Table 3.3 presents the distribution of the study participants across departments and hierarchy levels.

While the number of participants from Marketing is close to that of many other departments, it is to be noted that Marketing is a much smaller department compared to all others. Consequently, most people from Marketing involved in innovation were included in the study.

Table 3.2: The Longitudinal Research Phases at the Partner Company, adapted from Lakiza and Deschamps (2018)

	Phase I	**Phase II**			**Phase III**		
	2015-2016	**2016-2017**			**2017-2018**		
	Researcher 1	Researchers 2, 3 & 4			Researchers 5, 6 & 7		
Research Themes	Planning & Early Implementation of Innovation Tools	Further Implementation and Integration of Innovation Capabilities			Continuous Organizational Change: Development, Implementation, Diffusion, Use and Acceptance		
Knowledge Development	Implementation of Product Development Processes (PDP) and basis for Innovation Strategy	**Roles of innovation PMS and culture**	Tools for R&D-marketing interface at FEI	Tools for Uncertainty-Novelty assessment	Multifunctional integration during major product innovations: Digitalization of products (IoT)	Development and use of market scanning & analysis tools to facilitate radical/ disruptive innovations	Development of methods for Open & Collaborative Innovation and expansion of technological innovations
Knowledge Transfer	- Partial stage-gate implementation - Development of basic methods for Business case - Preliminary data analysis for Strategic Arenas	**Establish-ment of basic innovation measures**	Assessment of idea generation processes	Diagnostic of Maturity Levels and needs for information system and management	Planning the introduction of IoT in one product line	More quantitative data analysis tools to improve objective & fair technology and new opportunities analysis	Extension of number and types of collaborators to raise innovation levels and productivity

While Table 3.3 compiles the main participants throughout the field research, it excludes part of the people who participated in the Innovation Quotient (IQ) Questionnaire (for more details see section 3.5.3.5). A larger group than the regular participants was invited to fill in the questionnaire and, since the participants who answered online were anonymous, it is impossible to know how exactly they overlap with the regular study participants.

Table 3.3: Distribution of the Study Participants across Departments and Hierarchy Levels

Department	CEO/EVP	VP	Director	Manager	Staff	Total
IRDT (Engineering)			1	4	3	**8**
Rest of Engineering		1	3		4	**8**
Marketing		1			3	**4**
Sales	1	1		1		**3**
Customer Service			1		2	**3**
IT/Strategy		1	1		1	**3**
Operations	1				1	**2**
Human Resources		1			1	**2**
CEO	1					**1**
Total	**3**	**5**	**6**	**5**	**15**	**34**

The study participants all have their own backgrounds and biases which guide their input through the various data collection methods used. Moreover, as the participation in the study was not mandatory, some people's level of participation was influenced by their interest in innovation and/or organizational culture. The influence of participants' biases on the research findings was limited by the use of numerous data collection methods, data triangulation, and confirmation of analysis and interpretations with fellow researchers.

3.5 Data Collection and Analysis Choices

This study qualifies as **mixed-model research** as it combines quantitative and qualitative data collection and analysis methods (Saunders et al., 2011). This approach is relevant when there is a need for triangulation to corroborate research findings within a study (Bryman, 2016). When conclusions coming from two or more different data sources or data collection methods are similar, it gives more confidence in the interpretation and analysis, as it reduces various sources of bias that are inevitable when conducting research with humans (Saunders et al., 2011).

First, the iterative flow between data collection, analysis and interpretation is explained in section 3.5.1. Subsequently, data reliability and validity are discussed in section 3.5.2. Finally, each of the data collection methods used in this study is detailed in section 3.5.3.

3.5.1 Iterative Flow between Data Collection, Analysis and Interpretation

Data analysis is a sense making process that implies "taking something apart" (Stake, 2000). In qualitative field research there is no specific beginning to data analysis (Stake, 2000) as it involves continuous iteration between data collection and data analysis (Strauss & Corbin, 1998).

Consequently, data analysis began during the first days in the field to identify patterns and questions in order to guide and facilitate subsequent data collection.

Any new observation made with one of the methods presented below was noted and a plan was made to attempt to corroborate it by using a different data collection method in the future. In addition, to limit participants' biases, it was important to obtain similar information from different participants. Similar findings were then clustered and discussed with the fellow researchers on-site in order to verify the author's interpretation and limit potential researcher biases. Once it was agreed upon with all the on-site researchers, the subject was discussed with the academic supervisor to strengthen the analysis and interpretation as well as decide on relevant next steps following the recent findings.

Data was collected through the various means described in this section. Reoccurring observations were compiled and triangulated. Emerging patterns were discussed with fellow researchers on a weekly basis and with the academic supervisor monthly or anytime major questions or observations arose. Mid-term preliminary observations and propositions were assembled and presented at the ISPIM (International Society for Professional Innovation Management) Conference in Toronto in March 2017 (Lakiza, Deschamps, & Brodeur, 2017). They were reviewed again during the last month of field research in order to be presented to the Company as well as for the grant application for phase III of the research (Deschamps et al., 2017). A final analysis was done during the months following the end of phase II on site research.

The researcher's background working in manufacturing as well as with intrapreneurs, and building an intrapreneurial culture as well as implementing a PMS in a SME plays an important role in the sense-making process (Creswell, 2005). The researcher's experience guided the understanding of participants' stories, interpretation and next steps for data analysis. This is one of the reasons why conferring with fellow researchers and the academic supervisor was so crucial for the entire duration of the study.

3.5.2 Data Reliability and Validity

In order to ensure the reliability of the research findings, attention was paid to the four threats to reliability described by Robson (2002). Table 3.4 presents the mitigation objectives and approaches taken to address each of these threats. Robson (2002) also addresses threats to validity. The mitigation objectives and approaches for each of the five threats are presented in Table 3.5.

Table 3.4: Mitigation Objectives and Approaches to Address Threats to Reliability

Threats to Reliability (Robson, 2002)	**Mitigation Objectives**	**Mitigation Approaches**
Subject or participant error	Limit bias due to the variation of the degree of enthusiasm that an employee can have toward his work and his colleagues throughout the work week and evolving work environment.	• Researcher's daily presence in the field for a significant period of time (11 months); • Use of multiple data collection methods, some using direct interaction with participants while others allowing observation of their actions and interactions with others from other departments and hierarchical levels; • Repeated interactions with the same participants on the same subjects over time.
Subject or participant bias	Limit bias created by employees saying what their employers want them to say.	• Respondent's anonymity was ensured for all individual interactions with the researcher – a Certificate of Ethical Compliance was issued for this study and Ethical guidelines were followed; • As most participants took part in individual as well as group interactions with the researcher, it was possible to compare their varying opinions in different environments – multiple data collection methods gave numerous opportunities to validate or reject any specific answer by a participant.
Observer error	Ensure consistency in the ways the same questions are asked of different participants.	• The IQ Questionnaire questions were used as is (Rao & Weintraub, 2013); • The structured parts of interviews and workshops were administered by the same researcher.
Observer bias	Limit false interpretations.	• Corroborating analysis and interpretation with fellow researchers and academic supervisor; • Possibility to test analysis and interpretations over time.

Table 3.5: Mitigation Objectives and Approaches to Address Threats to Validity

Threats to Validity (Robson, 2002)	**Mitigation Objectives**	**Mitigation Approaches**
History	Ensure that the relationships under study are not affected by an external event.	• The multi-year duration of the longitudinal study allows for multiple opportunities to confront the possibility of an effect of a specific event on the relationships under study; • The study objectives are not to prove a specific relationship but to understand a holistic view of the organizational dynamics affecting the relationships under study.
Testing	Avoid pressure on employees to deliver specific results during the study that would not represent their usual performance.	• The employees themselves are not under study and no specific performance related to the study objectives is expected of them.
Instrumentation	Discern the effects of the research on the participants' behaviour that could change based on preliminary results.	• The continuous on-site multi-year character of this research allows to see potential variations due to discrete events. • Given the intervention character of the research, some behaviour change is desired and accounted for in the data analysis and interpretation.
Mortality	Avoid participants dropping out of the study.	• This was not a concern for this research as most of the data collection work required was based on observation of and participation in regular daily work of the Company's employees.
Maturation	Discern the effects of other interventions on the relationships under study.	• The multi-year duration of the longitudinal study allows for multiple opportunities to confront the possibility of an effect of a specific event on the relationships under study; • The study objectives are not to prove a specific relationship but to understand a holistic view of the organizational dynamics affecting the relationships under study.

3.5.3 Data Collection Methods

A robust case study draws from multiple sources of evidence (Yin, 2013) and triangulation is key in order to obtain reliable outcomes (Saunders et al., 2011; Stake, 2000; Yin, 2013). Several primary and secondary data collection methods were used in this study so that key findings were corroborated by results obtained using at least two additional methods. Data collected during phase I of the longitudinal research was analyzed before the beginning of phase II on site. During the 11 months on-site the following data collection methods were used: document review, interviews, workshops, an Innovation Quotient questionnaire, observations and meetings. The seven data collection methods used are presented in Table 3.6 and categorized by primary versus secondary, and those used through action-research vs intervention-research. The use of each method is explained in more detail in this section while the interaction between data and analysis coming from each of these methods is shown in Figure 3.1.

Table 3.6: Summary of the Data Collection Methods used

Primary Data Collection Methods		**Secondary Data Collection Methods**
Action-research	Intervention-research	
3.5.3.3 Interviews 3.5.3.5 Questionnaire 3.5.3.6 Observations	3.5.3.4 Workshops 3.5.3.6 Observations 3.5.3.7 Meetings	3.5.3.1 Data Collected Prior to Phase II 3.5.3.2 Document Review

3.5.3.1 Data Collected Prior to Phase II

As previously mentioned, the author was present in the field during phase II of the longitudinal research. However, data collected during phase I, by Jonathan Brodeur and Isabelle Deschamps, is also used for this study (Brodeur et al., 2017; Deschamps et al., 2016). The methods used to collect data during phase I were the same methods as those used for this study and described in the following sub-sections. Key observations from phase I were discussed in detail among the research team in order to be explored further during phase II.

Additional steps were taken to consolidate the understanding of the system under study and help better prepare for the presence in the field. A stakeholder mapping exercise inspired by FSG's Guide to Actor Mapping (Gopal & Clarke, 2016) was carried out with the first researcher in order to understand (1) the key relationships among the main innovation stakeholders within the Company; as well as (2) the positioning of the company within its industry and main markets with

careful attention to system pressures (Horowitz, 2014). The latter was further explored through an industry analysis for the Canadian market (Lakiza, 2016; Yucel, 2015).

3.5.3.2 Document Review

As it is impossible for the researcher to be present throughout the Company's history, a document review can provide important data that the researcher could not witness themselves (Stake, 2000). Key documents pertaining to innovation management and KPIs identified through other data collection methods are presented in Table 3.7 (also see Figure 3.1).

Table 3.7: Documents Reviewed Following Identification through other Data Collection Methods

Document Identification Method	Document Description
Reporting of Phase I of longitudinal research	PDP Projects Portfolio Catalogue

Project charter interviews	- The Company's Annual Reports 2015 and 2016;
	- IRDT Vision 2020 documents:
	  o IRDT Vision 2020 Project Charter;
	  o IRDT Vision 2020 Voice-of-Customer (VoC) Survey;
	  o IRDT Vision 2020 VoC Survey Compiled Results;
	- PDP KPI development and tracking documentation;
	- Engineering department SWOT analysis documentation;
	- Innovation Center Business Plan;
	- Sample employee evaluation.

Interviews on past KPIs	AIM (Agile Innovation Management) Monthly Project Reports

Access to the Company's electronic innovation management folders was granted to the researchers. Consequently, it was possible to see the innovation management documentation and detect if something important was missing in the list of documents identified for review in Table 3.7.

3.5.3.3 Interviews

According to Stake (2000), ideally the data that we are looking for would be available through observation only, as the interviews are always biased by the interviewee's background, profile and interests. However, it is impossible for the researcher to be present during all important events over time. Hence, the interviews are necessary to complete the observations, especially in a longitudinal study. Interviewing is a crucial data source as it allows one "to find out from [people] those things we can't observe" (Patton, 1987). Moreover, "the interview is the main road to multiple realities"

(Stake, 2000) as it allows the researcher to uncover different ways that people view the same situation. Conversely, when multiple interviewees share the same point of view on a specific subject it is possible to establish patterns, make key observations and triangulate data. A collection of interviews paints a better picture than what any one individual can observe or experience (Stake, 2000).

A semi-structured approach (Merriam, 2002) was used for each of the interviews with mostly open-ended questions in order to favor open and free discussion (Esterberg, 2002; Kvale, 1996). The prepared interview questions were complemented with the use of follow-up and probing questions, when possible, to encourage participants to elaborate on the subjects of interest (Denzin & Lincoln, 2008; Stake, 2000). The interviews had different objectives and were conducted with a various number of stakeholders as presented in Table 3.8. The interview guides as well as more context on the interviews are available in Appendix A.

Table 3.8: Objectives and Number of Participants for each Type of Interview

Interview	**Number of participants**	**Interview Objectives**				
		Get to know stakeholders	Collect past data	Achieve shared understanding among stakeholders	Understand main motivations and barriers	Obtain feedback
Project Charter Discussions	16	✓	✓		✓	
Previous KPI data collection	10	✓	✓			
Mid-term Innovation KPI proposal	11		✓	✓	✓	✓

The interviews were conducted with employees coming from different departments and hierarchical levels ranging from junior design engineer to Executive Vice-President (EVP). The choice of employees for each type of interview was decided jointly by the researcher and the IRDT director using the following guidelines:

- Close involvement with product development and innovation:
    - At the time of study, only people from the Engineering and Marketing departments fit this criterion.

- Decision-making power regarding innovation:
    - This criterion added a few VPs from other departments to the list that contained mostly Engineering and Marketing employees.
- A mix of employees from different hierarchical levels, to allow for a more holistic view of the innovation management processes and practices.
- Interviewee relevance and their access to desired data for each of the interviews.

The interviews typically lasted for 30 to 60 minutes. A first interview with each new stakeholder included an introduction of the researcher's background to set the context and gain their trust (Patton, 1987). During the interview, notes were taken on the main answers and key comments. According to Stake (2000), during an interview, it is more important to listen carefully to gather the meaning behind the words than to take precise notes on the words that are said. Therefore, after each interview, a short period of time was set aside to take notes on the key ideas that were communicated and for memoing. As the interviews were held as part of the employees' work routine, no audio recording was used because this would have been unnatural to the interviewees. Moreover, according to Stake (2000), "the tape recorder is of little value unless ultimately an audio presentation is intended".

3.5.3.4 Workshops

A workshop is a period of extended group discussion and practical work that allows for an in-depth exploration of a subject. Two 3-hour workshops were developed and run during phase II on site. The high-level workshop outlines are available in Appendix B. These workshops also had the general objective of helping the Company develop innovation KPIs. In addition to objectives specific to each workshop, an essential part of the data collection was the observation of the interactions among the attendees during the workshops. A well-designed workshop sparks discussions, opens up subjects and uncovers data that would sometimes be impossible to bring up otherwise. The main objectives of both workshops are presented in Table 3.9.

The first workshop was run twice due to lack of common availability: with 8 people the first time and 3 the second. The second workshop had 5 attendees. In both cases, employees at different hierarchical levels and coming from both engineering and marketing were present, ranging from design engineer to VP. Given the time commitment and human resource costs in attending these workshops, they were held with a minimal number of available attendees while still making sure

that some key stakeholders were present for each of them. For the first workshop, the key stakeholders were the direct innovation decision-makers (VPs of Marketing and Engineering) while for the second they were some of the directors working more closely with existing innovation processes.

Table 3.9: Main Workshop Objectives

Workshop	Objectives
1: KPI Requirements Definition	- Collect input on what innovation means to different stakeholders and what kind of innovation performance they would like to see at their company; - Collect input on what it means in regard to the Company's new Vision.
2: Innovation System Mapping	- Understand synergy (or lack thereof) among the different departments in regard to innovation; - Understand effectiveness (or lack thereof) of existing innovation processes and flows; - Further understand system pressures on innovation success within the Company.
Workshops 1 and 2	- Better understand individual biases in order to take them into account when analyzing data collected from individual interactions; - Collect vital observations about the Company's culture; - Help broaden individuals' perspectives and achieve shared understanding among stakeholders, thereby allowing for richer discussions with individual stakeholders following the workshops; - Uncover past and present data to further explore in one-on-one interactions.

The workshops were also a good way to triangulate information as well as test the interpretation of data collected through other means. At least one of the two other researchers present on site during phase II attended each of the workshops in order to verify and corroborate findings from the exercise. Their notes were included in the final Minutes of Meeting (MoM).

3.5.3.5 Questionnaire

Based on the observations from phase I and the first few months of phase II, it was important to consolidate our interpretation of the state of the Company's organizational culture regarding innovation. To do so, a questionnaire developed by Rao and Weintraub (2013) to establish a company's Innovation Quotient (IQ), or how innovative is its culture, was used. This questionnaire is based on six building blocks of an innovative culture and was chosen as it can be easily used by the Company's employees to identify strengths, weaknesses and inconsistencies. This can help

start conversations toward a more innovative culture. The full questionnaire is presented in Appendix C.

The questionnaire was conducted with 31 respondents of different departments and varying hierarchical levels and seniority, defined here as time spent within the Company (see section 4.1.2 for more details on the distribution of participants in each category as well as results comparisons by category). Two ways of taking the survey were offered: self-administered by the participants online (13 respondents) or interviewer-administered (18 respondents). The latter allowed for additional comments and discussions resulting in richer data. In both cases, the participants were notified of the purpose of the study, the expected benefits, the protection of their confidentiality and their right to withdraw from the study at any time. They had the opportunity to ask any questions about the study or the questionnaire at any time before, during or after its administration.

The choice of invited participants was done based on their role with respect to innovation as well as their level of decision-making power. Consequently, there is a bias toward a higher proportion of senior managers compared to the Company's population as well as a higher number of participants from the Engineering department. The participation in the survey was optional. Therefore, the employees who chose to participate might have a bias or particular interest in innovation compared to those who did not.

3.5.3.6 Observations

We have the opportunity of having seven researchers on site at different periods of time, some overlapping. This allows each researcher to validate their observations with others as well as with the academic supervisor. Consequently, as previously mentioned, only observation data and data interpretations that were confirmed by other researchers were further used in this study.

To understand a company's culture it is important to pay attention to its "quiet, sometimes hidden, manifestations" that can often be seen through its informal channels (Schein, 2009). Being present on site daily as part of a team at the Company allowed for multiple observation angles and opportunities through various formal meetings and discussions, as well as the informal Company life such as lunch time discussions. While observations were also being noted during most of the other data collection methods described in this chapter, the main opportunities for observation that were not part of the core research activities referred to in the other data collection methods are

listed in Table 3.10. Among these opportunities, the researcher played various roles, from simply being present without participating, to sometimes developing workshops to support the team.

Table 3.10: List of Observation Opportunities and the Researcher's Level of Participation

Observation Opportunity	**Researcher's Level of Participation**
Innovation Center workshops, documents and KPIs	Observer, little contribution besides researching and providing past KPIs, feedback to IRDT director
Engineering Vision 2020 / Operational Plan workshops	Support in process workshop development and facilitation
IRDT Team Meetings	Observer, little contribution, feedback to IRDT director
Front-End of Innovation (FEI) Workshops (developed and run by one of the two other concurrent researchers)	Support in workshop development and data interpretation
Multisectorial Industrial Research Chair in Coatings and Surface Engineering (MIC-CSE) workshops (developed and run by one of the two other concurrent researchers)	Support in workshop development and data interpretation

Each observation opportunity had three key objectives:

- Understand stakeholder dynamics;
- Understand company priorities;
- Understand company culture.

A mix of both quantitative and qualitative observation approaches was used during this research. The quantitative approach was used through aggregation of repeated observations. The qualitative method calls for "finding good moments to reveal the unique complexity of the case" (Stake, 2000) to describe a story which shows how the various key observations fit together.

Before each observation opportunity, a list was prepared of what to pay attention to as well as previous observations that could possibly be repeated or contradicted. During observations, the focus was on this list while also paying attention to other conditions that may influence interpretation and analysis of collected data. Same as for the interviews, any opportunity to observe demands a scheduled time shortly after to take notes on observations and preliminary interpretation (Stake, 2000). Additional time was planned to discuss the observations with the other researchers and occasionally with the academic supervisor.

3.5.3.7 Meetings

Meetings are a part of the day-to-day company life. As part of the intervention-research strategy, the author had to run numerous meetings over the 11 months on-site in order to advance the innovation KPI development mandate. The main meetings that took place as part of this mandate as well as the primary objectives for each of them are presented in Table 3.11. Meetings were often a good way to verify, complete and triangulate data obtained through other means.

Table 3.11: List of Meetings and their Respective Objectives

Meeting	**Plan and review plans**	**Progress Review**	**Achieve shared understanding among stakeholders**	**Obtain Feedback**	**Take Decisions**
Weekly meetings with IRDT director	✓	✓		✓	✓
KPI Charter Presentation to Engineering in the beginning of mandate / phase II			✓	✓	
Draft KPI Proposal to CEO & COO at mid-term			✓	✓	✓
Monthly meetings with Marketing & Engineering VPs		✓	✓	✓	✓
'Low hanging fruits' (LHF) KPI development meetings (weekly during the last two months)			✓	✓	✓
Economic Value for Customers (EVC) development meetings (bi-weekly during the last two months)				✓	✓
Bi-monthly Mitacs follow-up meetings	✓	✓	✓		✓

CHAPTER 4 RESEARCH FINDINGS

This chapter presents the key results and field observations, as well as the research propositions. An overview of the IQ questionnaire results is presented in section 4.1. The main research observations gathered through all data collection methods and grouped in four categories are presented in section 4.2 using the Levels of Perspective iceberg model. Then, the challenges met due to the low level of maturity of the Company's innovation processes and teams are discussed using a summary of ten business process management (BPM) maturity models in section 4.3. The innovation KPI development challenges connected to the four categories covered in section 4.2 and to the low process maturity described in section 4.3, are explained in section 4.4. The deductions regarding each of the five guiding questions resulted in four propositions that are explained in section 4.5. Finally, a conceptual framework was developed based on three of the four propositions and is presented in section 4.6.

4.1 Results of Innovation Quotient Questionnaire

The IQ questionnaire was introduced at mid-term of the second phase of the longitudinal research. Its main objective was to verify and confirm some of the key observations thus far. The questionnaire designed by Rao and Weintraub (2013) addresses many of the observations that were made during the first phase and the beginning of the second phase of the longitudinal research. Consequently, it was judged appropriate for the task at hand.

The questionnaire is composed of 54 statements available in Appendix C. The statements must be ranked on a scale of 1 to 5, where 1 means 'not at all' and 5 stands for 'to a very great extent'. It should be noted that as the lowest possible score is 1, the middle value of the scale is 3, not 2.5. Each of the 54 statements is attached to an 'Element'. Three 'Elements' form a 'Factor'. Three factors form a 'Building Block'. The average of the six 'Building Block' scores provides the general IQ score.

The analysis components suggested by Rao and Weintraub (2013) were used for the questionnaire analysis and are as follows:

- Average for each question/element;
- Distribution of the responses for each element;

- Average for each factor;
- Average for each building block;
- Average of the 6 building blocks (represents the IQ);
- Comparison of all these components across:
    - Departments;
    - Hierarchy levels;
    - Seniority.

Figure 4.1 presents the results for the six building blocks as well as the general IQ score. As shown in Figure 4.1, all these scores are below 3. According to Rao and Weintraub (2013), innovative companies score high for at least one of the building blocks. This is not the case for our Partner Company. A complete table of results at all four levels, including the score for each of the 54 elements, is available in Appendix D.

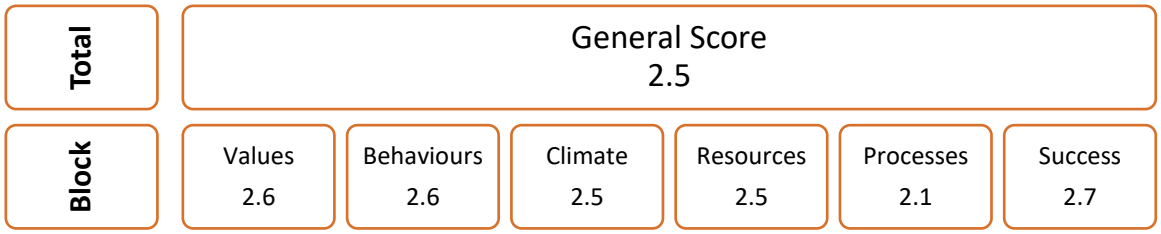

Figure 4.1: High-level Results of IQ Questionnaire (General and Building Block Scores)

The following sub-sections highlight the results most relevant to the research subject. The results are first presented by 'Building Block' in section 4.1.1. Then, the results are compared across Company functions, hierarchy levels and seniority in section 4.1.2.

4.1.1 Results of Innovation Quotient Questionnaire by Building Block

The following subsections present all average scores for each 'Building Block'. Moreover, the key results linked to other study observations and themes, as well as relevant participants' comments are highlighted. Detailed distribution graphics for all 54 elements are available in Appendix E.

4.1.1.1 Values

According to Rao and Weintraub (2013), "values drive priorities and decisions, which are reflected in how a company spends its time and money". The 'Values' block is the Company's highest

scoring block with a score of 2.7, and is composed of the ‘Entrepreneurial’, ‘Creativity’ and ‘Learning’ factors. The three factors obtained very similar scores with respectively 2.8, 2.6 and 2.8. Figure 4.2 shows all the scores for the ‘Values’ building block.

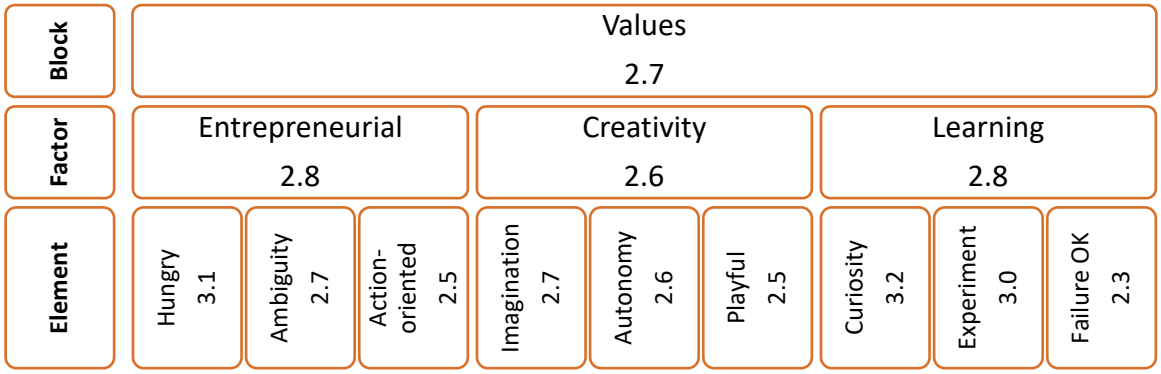

Figure 4.2: IQ Questionnaire Scores for the Values Building Block

The highest element scores of this block were ‘Hungry’ with 3.1, and ‘Curiosity’ with 3.2. Many respondents commented that there is a desire to experiment, but that it is not easy to accomplish because of how the Company is structured. Numerous initiatives never make it outside of the Company as they are blocked somewhere in the chain of command or there is simply no follow through. Many respondents specifically mentioned that the Company is very conservative and risk averse, with little desire to change until there is no choice left.

Three other elements of this block support the assessment that the Company is risk averse. The ‘Ambiguity’ element, which assesses appetite and tolerance for ambiguity, scored 2.7. The ‘Autonomy’ element, which focuses on the freedom to pursue opportunities, scored 2.6. Finally, the ‘Failure OK’ element, which discusses how the employees’ view failure, exhibits the lowest score of the ‘Values’ block with 2.3.

4.1.1.2 Behaviours

“Behaviors describe how people act in the cause of innovation” (Rao & Weintraub, 2013). The ‘Behaviours’ block is composed of the ‘Energize’, ‘Engage’ and ‘Enable’ factors with the respective scores of 2.9, 2.2 and 2.9. There is a significant gap between the ‘Energize’ score of 2.9 and the ‘Engage’ score of 2.2. The former is about how the Company leaders ‘Inspire’, ‘Challenge’ and ‘Model’ the right innovation behaviours. The latter is about how the leaders actually work with their staff to help them achieve their innovation efforts. This contrast suggests that the leaders’

actions toward innovation are not fully coherent with their words. In addition, while initiative taking is essential for innovation and an Intrapreneurial Culture (Kuratko, 2009; Rao & Weintraub, 2013), the 'Initiative' element exhibits the lowest score of this block and one of the lowest scores of all 54 elements with 1.9. Figure 4.3 shows all the scores for the 'Behaviours' building block.

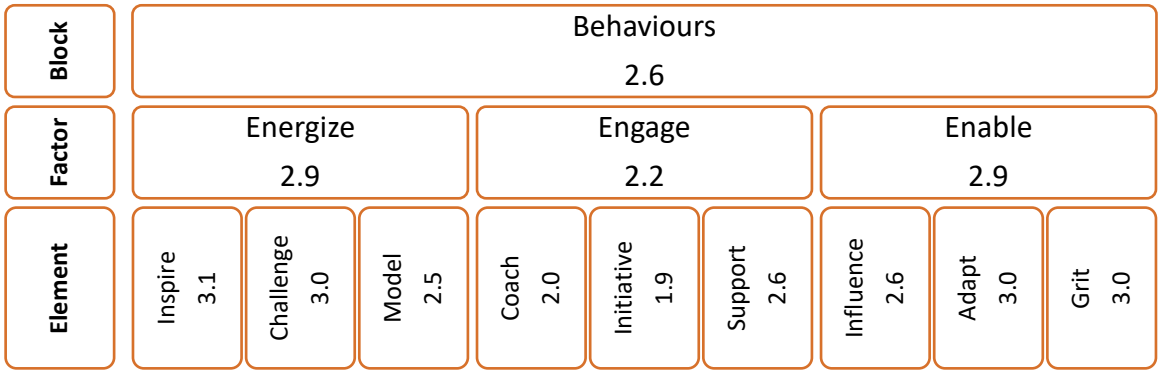

Figure 4.3: IQ Questionnaire Scores for the Behaviours Building Block

4.1.1.3 Climate

According to Rao and Weintraub (2013), "an innovative climate cultivates engagement and enthusiasm, challenges people to take risks within a safe environment, fosters learning and encourages independent thinking". The 'Climate' block scored 2.5 and is composed of the 'Collaboration', 'Safety' and 'Simplicity' factors with the respective scores of 2.4, 2.9 and 2.2. Figure 4.4 presents all the scores for the 'Climate' block.

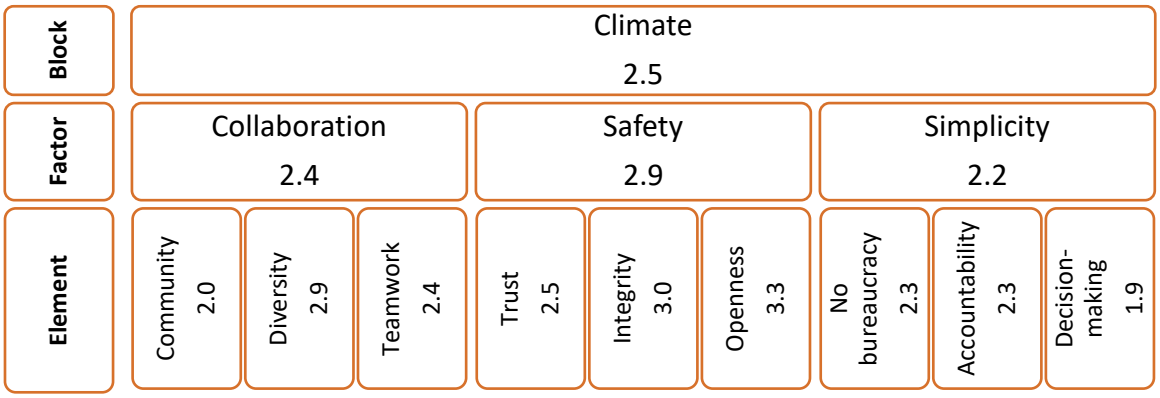

Figure 4.4: IQ Questionnaire Scores for the Climate Building Block

The 'Trust' element, from the 'Safety' factor, specifically explores the coherence between the actions and the expressed values of the Company's employees. It scored 2.5, thus contributing to

the evidence of the gap between words and actions previously discussed in the ‘Behaviours’ block. Moreover, several respondents mentioned that the Company values are not well known. Many of those who were familiar with the values said they did not know how to connect their actions to those values.

Internal alignment is further explored in the ‘Collaboration’ factor with ‘Teamwork’ at 2.4 and ‘Community’ at 2.0. The latter specifically addresses the existence of a common innovation language and is one of the lowest scores of all 54 elements. Most of the respondents agreed on the score of the ‘Community’ element as 80% of the participants scored 1 or 2.

The ‘Simplicity’ factor also provides results particularly relevant for this study. First, the ‘No bureaucracy’ element scored 2.3, contributing to the assessment of an execution-oriented culture. The two other elements, ‘Accountability’ and ‘Decision-making’, respectively scored 2.3 and 1.9. These results exhibit the challenges of taking responsibility and making decisions concerning innovation initiatives at the Company.

4.1.1.4 Resources

Rao and Weintraub (2013) break down the ‘Resources’ block into three factors: ‘People’, ‘Systems’ and ‘Projects’. ‘People’ scored highest amongst the three with 3.1. ‘Systems’ and ‘Projects’ respectively scored 2.3 and 2.5, lowering the block score to 2.6. Two of the ‘Systems’ element scores show how the lack of appropriate systems contributes to the Company’s lack of internal and environmental alignment. The ‘Communication’ score of 2.3 confirms the lack of internal collaboration tools. The ‘Ecosystem’ score of 2.4 shows deficiency in leveraging external relationships to pursue innovation. All scores for the ‘Resources’ block are presented in Figure 4.5.

The ‘Projects’ factor scores are particularly interesting as they explore the existence of dedicated ‘Time’, ‘Finance’ and ‘Space’ for innovation. The three elements respectively scored 2.2, 2.7 and 2.6 confirming that innovation is not a priority and benefits from few dedicated resources. Most of all, the employees do not make time for innovation.

4.1.1.5 Processes

“Processes are the route that innovations follow as they are developed” (Rao & Weintraub, 2013). While the other five blocks have very similar scores, this one is the lowest at 2.1. It is composed of the ‘Ideate’, ‘Shape’ and ‘Capture’ factors referring to the different stages of innovation. They

scored respectively 2.3, 1.9 and 2.0, showing that, although ideation processes are weak, the effective execution of innovation projects and their marketing are even weaker. All scores for the 'Processes' block are presented in Figure 4.6.

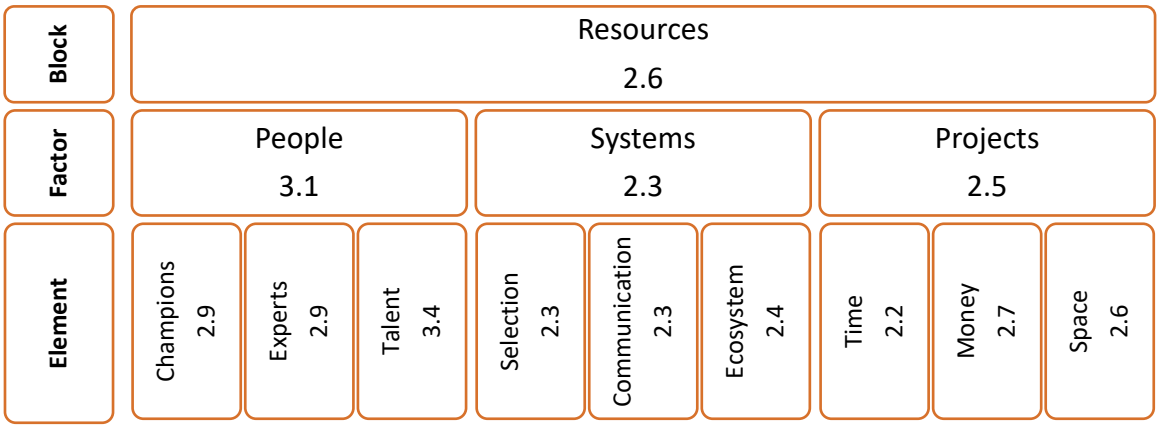

Figure 4.5: IQ Questionnaire Scores for the Resources Building Block

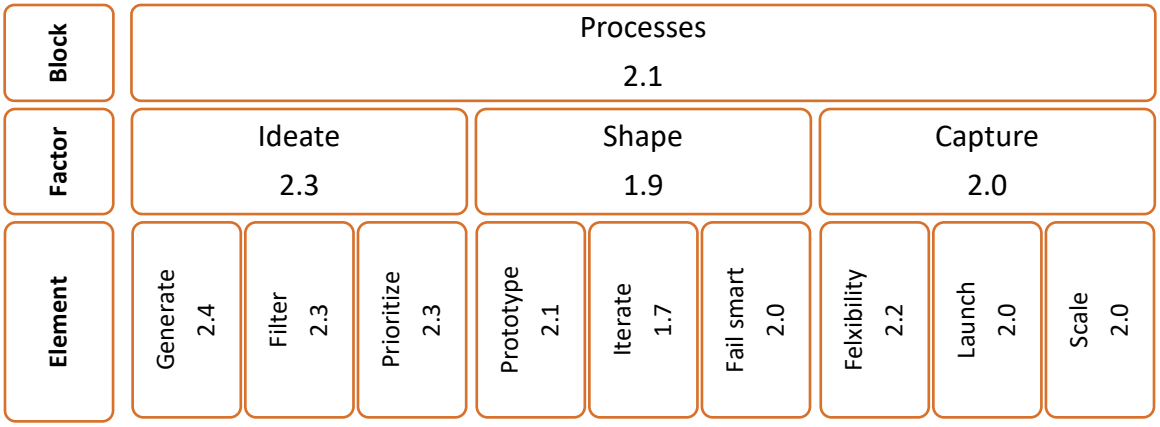

Figure 4.6: IQ Questionnaire Scores for the Processes Building Block

The 'Prioritize' element scored 2.3 and shows the lack of a clearly articulated risk portfolio. Moreover, there is a significant lack of feedback loops between the Company and its customers as portrayed by the 'Iterate' score of 1.7 which is the lowest of the 54 element scores.

Finally, the efficiency of innovation processes is very low as all the element statements that mentioned speed of execution (Prototype, Fail Smart, Launch and Scale) scored either 2.0 or 2.1. In addition, during the administration of these specific questions, many respondents mentioned that their innovation projects and processes turnaround is too slow and speed is a major problem. Some employees even qualified the Company's processes as its 'biggest organizational obstacle'.

4.1.1.6 Success

The ‘Success’ block with its score of 2.6 covers three levels of success: ‘External’ with a score of 2.6, ‘Enterprise’ with 2.8 and ‘Individual’ with 2.3. Figure 4.7 presents all scores for the ‘Success’ block.

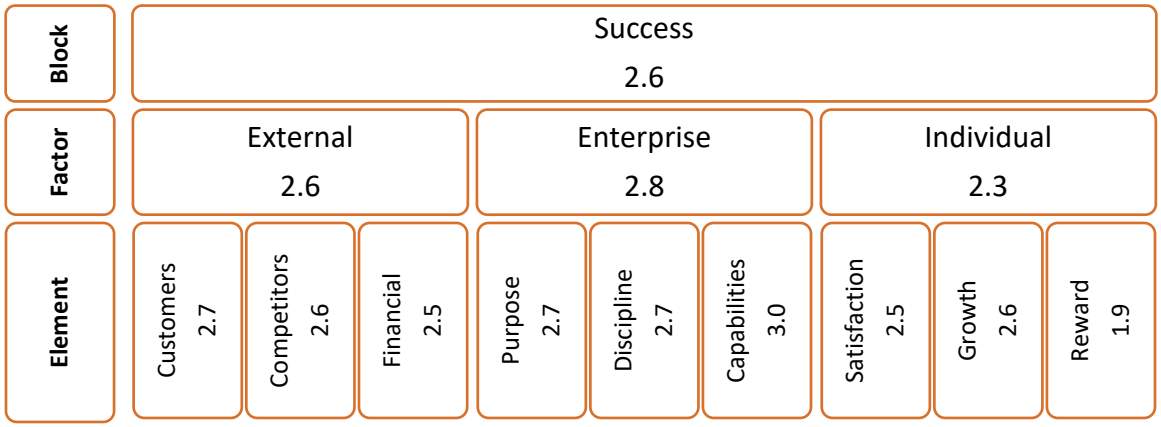

Figure 4.7: IQ Questionnaire Scores for the Success Building Block

The three ‘External’ factor questions explored the Company’s success through the lenses of its ‘Customers’, ‘Competitors’ and ‘Financial’ performance. They were the most difficult to score for the majority of employees, many of which said that they ‘have no idea’ on how the Company is perceived. This further confirmed the Company’s disconnect from the external systems it is part of.

The ‘Individual’ success explores the employees’ satisfaction with their participation in innovation work, their professional growth potential and the rewards they get for being innovative. With 2.3, this factor scored lower than the two other perspectives of ‘Success’. Its lowest element is ‘Reward’ with 1.9. This element scoring distribution is one of the most consistent with 75% of respondents scoring 1 or 2. No one scored it 4 or 5.

4.1.2 IQ Questionnaire Results by Category

The results have been compared based on the respondents’ function, hierarchy level and seniority. The high level of these comparisons is presented in the following subsections. While these comparisons can raise relevant questions, the sample for each category is small and thus cannot serve to draw conclusions.

4.1.2.1 Results Based on Functions

Employees from 10 departments responded to the questionnaire. For several departments there was only one or two respondents, which cannot be considered representative of the entire department. To simplify the presentation of the results, the 10 departments were grouped into four functions as follows:

- Engineering: most respondents are from this department, so it was not grouped with any other;
- Marketing, Sales, and Customer Service & Distribution: these three departments all focus on customers and had similar scores;
- Operations is composed of Operations and Manufacturing Operations;
- Others is composed of IT, Strategic Planning, and Continuous Improvement: these were the remaining three departments with one or two respondents each, and their responses were similar.

The percentage of respondents from each function is presented in Figure 4.8. An equivalent figure with the 10 departments is available in Appendix F.

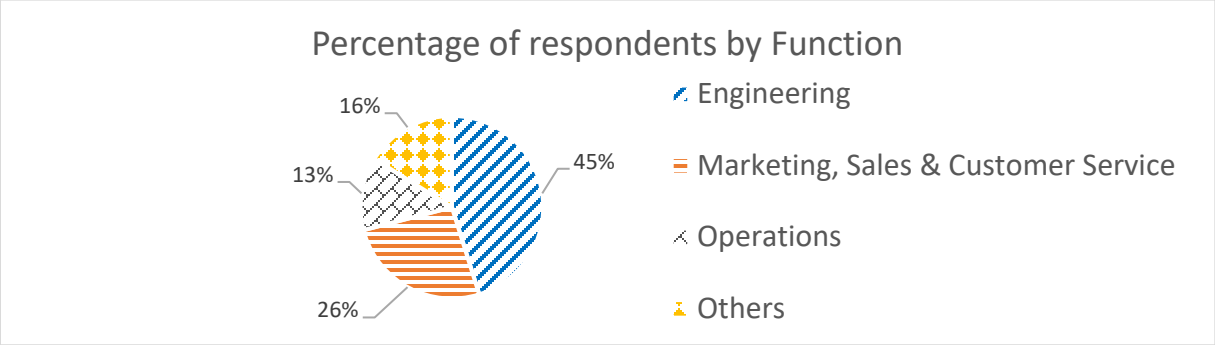

Figure 4.8: Percentage of Respondents per Function

The scores across the four functions for the six building blocks are presented in Figure 4.9. The Engineering and Marketing scores are always close, with Engineering slightly higher in four of the six blocks. These are the two groups most involved with innovation and that communicate the most about it. This might explain their similar perspectives on the state of innovation at the Company as seen through these scores. The ‘Others’ score is systematically and significantly lower for the six building blocks. This might be influenced by the nature of the work that these departments do. They are mostly composed of people who think about how to improve things and better prepare for what is next. Consequently, they might be extra critical of the current state.

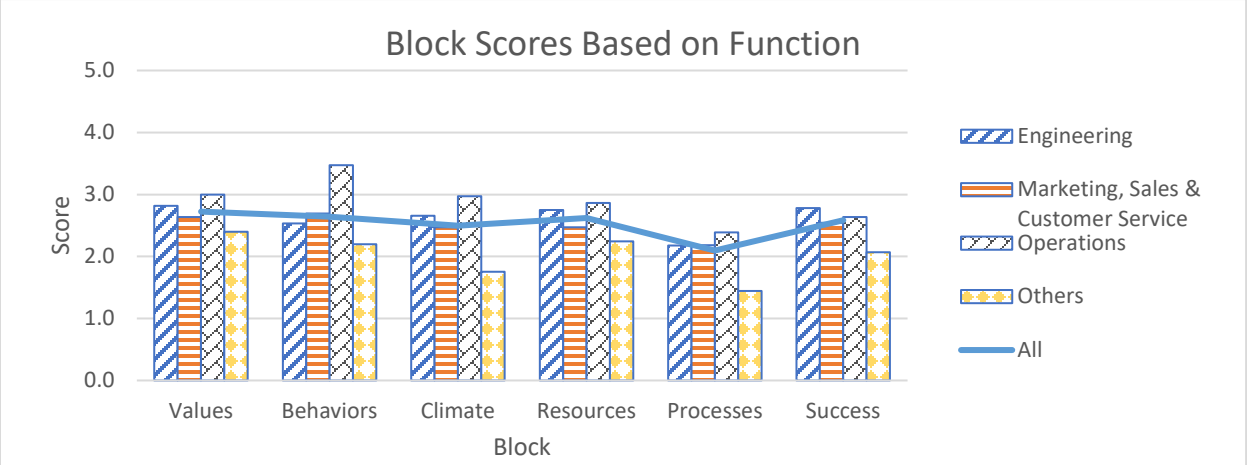

Figure 4.9: Block Scores Based on Respondents Function

The Operations scores are higher than the rest for all blocks except for the 'Success' block. During the IQ questionnaire administration and other occasions, several employees mentioned that, at the Company, innovation must not disturb operations. Technology and product innovations that require new setups or ways of doing things from Operations are not welcome. Moreover, there is very little involvement of Operations staff during innovation processes. Consequently, when it is time to manufacture a new product, Operations often claim that it is not feasible. It is thus possible that for Operations employees, any amount of innovation is perceived as more significant.

4.1.2.2 Results Based on Hierarchical Levels

The percentage of respondents based on their Hierarchical level is presented in Figure 4.10.

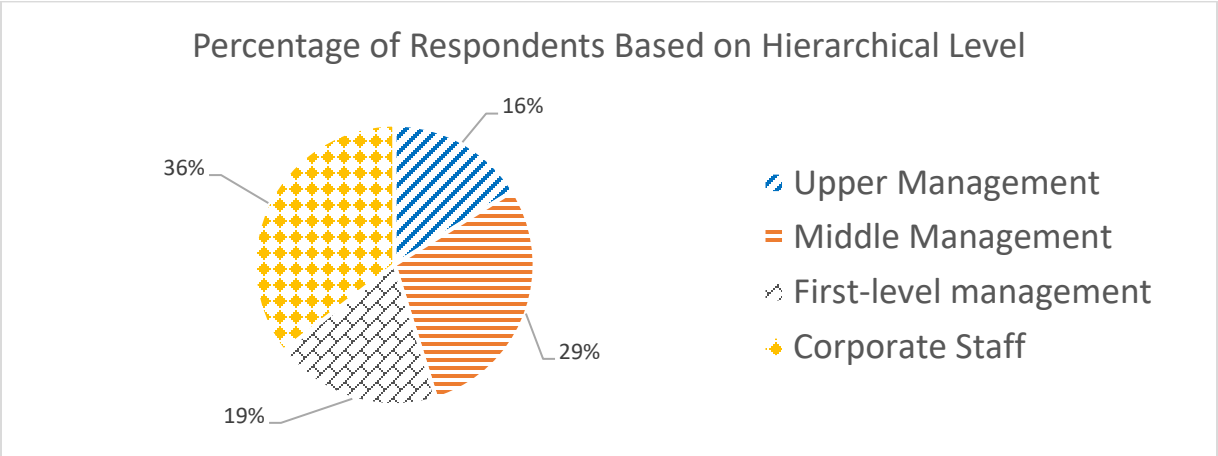

Figure 4.10: Percentage of Respondents based on their Hierarchical Level

The scores across the four Hierarchy levels are presented in Figure 4.11. According to Rao and Weintraub (2013), upper-management often scores higher than their staff for a number of elements. At our Partner Company, the upper-management scores are the highest for all blocks except 'Values'. The middle management scored the lowest in all blocks except 'Values'. This may be the result of the classical situation where middle management is stuck between VPs and their staff, with the latter being asked for things they have no idea how to achieve. Moreover, the staff and first-level management scores are close for most of the blocks. This could be a reflection of the Company's high level of centralization and low level of delegation (as discussed in section 4.2.1).

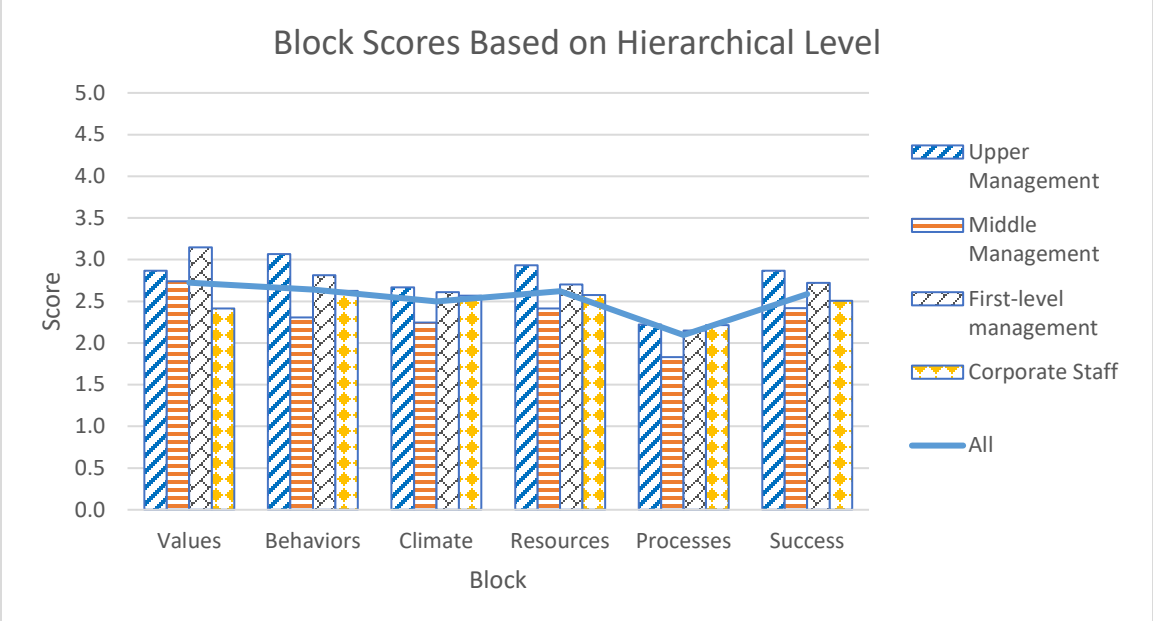

Figure 4.11: Block Scores Based on Hierarchical Level

4.1.2.3 Results Based on Seniority

Figure 4.12 illustrates the percentage of respondents of different Seniority levels at the Company.

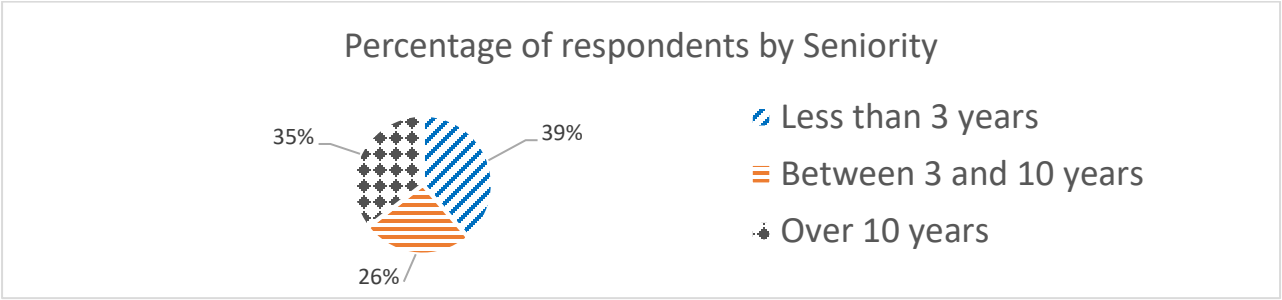

Figure 4.12: Percentage of Respondents based on the Employees' Seniority

The score variations based on the employees' Seniority are presented in Figure 4.13. The employees that have been with the Company for less than three years scored systematically and significantly lower on all six building blocks. This group is composed mainly of employees that are younger and/or have recently joined the Company but have significant previous experience. The scores for the two other groups are very close for all blocks except 'Behaviours'. The Company has a high proportion of its employees who have worked there for their whole career and thus have greater difficulty in imagining how things could be different. This might influence their scoring and explain the gap with younger employees and employees with previous experience.

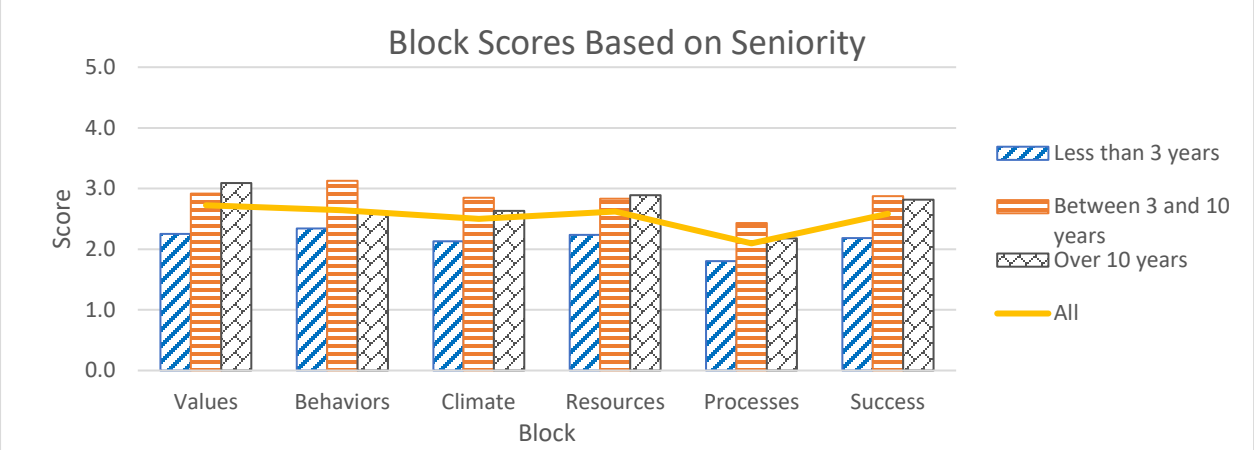

Figure 4.13: Block Scores Based on Seniority

4.2 Key Observations Regarding the Efforts to Rejuvenate Innovation Capabilities

Longitudinal field research provides a unique opportunity to dive deeper into understanding the relationships under study. To do this systematically, a simplified version of the Levels of Perspectives iceberg model (Kim, 2002; Senge et al., 1999) was used, as presented in Figure 4.14. Such a model is appropriate when trying to understand and study relationships and change in organizations as it allows a more holistic understanding of the system that we want to transform. The first level is comprised of Events. The second level goes beyond discreet activities (Events) and aims to discern what is happening over the longer-term (Patterns and Trends). The third level is about understanding the underlying structures causing the issues or behaviours at stake (Structures). Finally, the Mental Models level is about uncovering what kind of thinking or paradigms can explain the observed behaviours and the ways that the system is structured.

The ‘Levels of Perspectives’ iceberg model allows one to go beyond what can be seen - the ‘symptoms’ - to better understand the human aspects behind some actions, choices, and priorities. This helps understand deeper reasons behind resistance to change and levers for change. Typically, the deeper you go ‘under water’, the higher the leverage of the actions taken for change (Meadows, 1999).

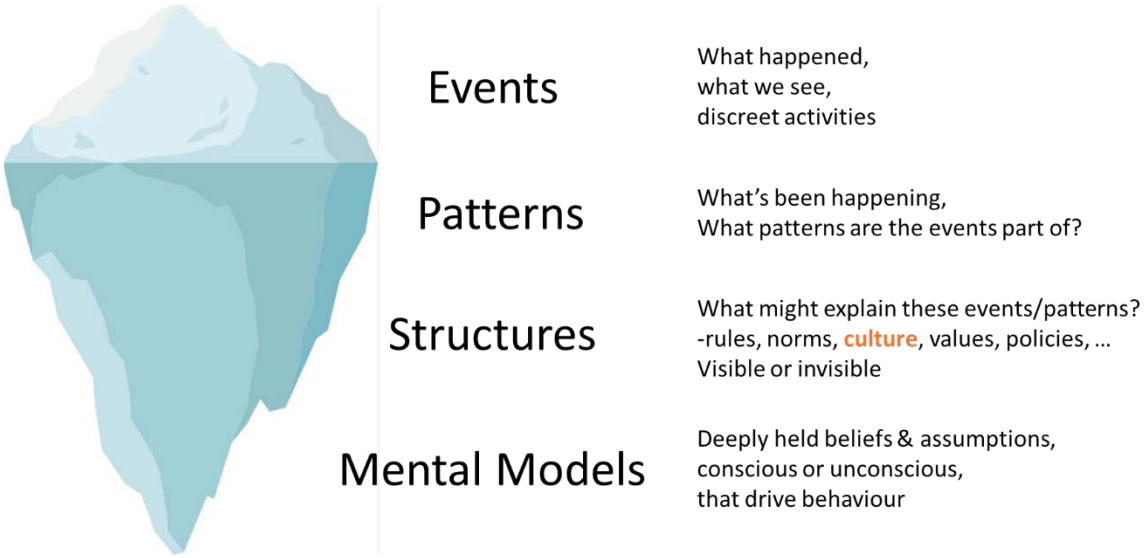

Figure 4.14: Simplified Levels of Perspectives Iceberg Model

As explained in Chapter 3, our research findings are based on the triangulation of data coming from multiple data collection methods. Only information coming from multiple observations and corroborated by fellow researchers was considered and analyzed. One core category emerged following the grounded theory coding and memoing tandem explained in section 3.2.1. This category refers to the focus on the execution of deliverables as opposed to the achievement of objectives and was named ‘Execution mindset’. Three related categories also emerged:

- Risk aversion: preference for what is certain and avoidance of ambiguity;
- Lack of internal alignment: lack of strategic/vertical alignment as well as synergistic/horizontal alignment among the employees of different hierarchical levels and departments;
- Lack of environmental alignment: lack of understanding and appropriate positioning within the systems the Company is a part of (customers, industry, business partners, etc.).

Data for these four categories was collected, analyzed and structured at different levels of the iceberg as follows:

- **Events**: What can be seen directly, through discreet actions and behaviours.
    - The observations regarding the 'Event' level of each of these categories is omitted in this thesis as these could allow one to identify the opinions of some participants thus violating confidentiality.
- **Patterns and Trends**: Can be deduced from repetition of events or observation of trends over time.
    - The focus in this paper is mainly on patterns as, in general, more time is required for a reliable observation of trends.
- **Structures**: Can be formal or informal. Structures can be seen through observation of interactions among employees and processes, as well as through analysis of official and unofficial rules, norms and policies.
- **Mental Models**: Can be deduced by combining the Company's history and values with the employees' beliefs and assumptions (based on their answers and comments to the IQ Questionnaire as well as during the various interviews) – by understanding what drives their daily behaviours and actions.

4.2.1 Risk Aversion

Risk is a key ingredient in innovation and in intrapreneurial companies (Christensen, 1997; Covin & Slevin, 1991; Kuratko et al., 1993; Miller, 1983; M. H. Morris et al., 2006; Pinchot III, 1985; Rao & Weintraub, 2013; Tellis et al., 2009; Wiklund & Shepherd, 2005). Numerous observations regarding the Company's approach to risk and its management were collected and summarized in Table 4.1 with sample quotes. The data collection sources for each observation are presented in Table 4.2.

The family Company under study was founded by an inventor who, until very recently, was still the key source of innovation. It was led by family owners for decades with family members freely taking decisions without having to report on them. In this context, the employees, many of whom have worked for the Company for most of their careers, got used to an environment where they don't have any real decision making power, no matter their hierarchical level. As discussed in section 4.1.2.2, there is little difference between staff and first-level management.

Table 4.1: Levels of Perspectives Iceberg Regarding Risk-aversion with Sample Quotes

Level	Observations Regarding Risk-aversion	Sample Quotes
Pattems	P1. Low & slow adoption of new processes;	"We have been trying to have them use this new tool for a year and they keep doing what they have always done." – Engineering Manager
	P2. Many initiatives don't make it out of the company;	"There is a lot of fear to go forward with something new." – Design Engineer
	P3. Decision avoidance, low delegation and poor decision-making	
	P3.1. Priority to customer orders over development projects;	"We don't like to fail. When we take an order we're under the gun and so we can't afford to fail." – Engineering Director
	P3.2. Decisions are often taken higher in the hierarchy than they should according to the role definitions;	"Only a couple of people take all the decisions" – Design Engineer "There is too much in VPs' hands" – Product Manager
	P3.3. Bosses change their employees' decisions without discussing it with them;	"If the boss does not like your decision, they will simply change it." – Procurement Director
	P3.4. Everyone wants someone else to take the decisions – decisions that do not fall under a specific team often bounce between the managers/directors/VPs for a long time;	"The people protect their egos. They are afraid to be responsible so they avoid taking decisions and giving opinions." – Product Manager
	P3.5. Historically, top family members take important decisions without necessarily considering the ideas and arguments that were brought to them. The rationale behind the final decisions is rarely shared.	"Unless you give your idea to a high-up nothing will change and no one will use your ideas." – Design Engineer
Structure	S1. Few risk management processes;	"The risk portfolio is nonexistent." – Product Manager
	S2. Little incentive to push innovation - Few reward structures, especially for innovation, while a lot of resistance which makes innovation work very exhausting;	"The one thing you do wrong will be pointed out forever." – Design Engineer "There are a lot of walls to break to get somewhere." – Design Engineer
	S3. Low accountability regarding individual work – little use of employee evaluations;	"Many employees refuse to be evaluated!" – Engineering Director
	S4. Few decision making processes;	"We do the same things forever, it's easier." – Design Engineer
	S5. Silo structures don't offer any clear mechanisms for transdisciplinary work and decisions required for successful innovation.	"It is difficult to work in teams because of how the company was built: with separate data bases and closed functional teams." – Engineering Manager
Mental Models	M1. Little desire to change unless there's a perception of no choice left – Very conservative mentality;	"It is a very conservative company. There is not a lot of desire to change even when we know that something has to change. We wait until there is no choice left." – Design Engineer "We try to fix what we have instead of experimenting with something new." - VP
	M2. Little decision-making power provides an 'I'm just a cog' feeling to many employees who consequently don't feel empowered to take initiative or be innovative.	"There are few procedures on how to change something." – Design Engineer

Table 4.2: Levels of Perspectives Iceberg Regarding Risk-aversion with the Data Sources

Iceberg Level	**Observations**	**Data Sources**							
		Prior Data (phase I)	Document Review	Interviews	Workshops	IQ Questionnaire	Observations	Meetings	Fellow Researchers' Observations
Patterns	P1. Low process adoption	✓	✓	✓		✓	✓		✓
	P2. Initiatives don't make it out			✓	✓	✓	✓	✓	
	P3. Poor Decision Making (DM)	✓		✓	✓	✓	✓	✓	✓
	- P3.1	✓		✓	✓	✓	✓	✓	✓
	- P3.2			✓		✓	✓	✓	
	- P3.3			✓		✓		✓	
	- P3.4						✓	✓	✓
	- P3.5	✓		✓	✓	✓		✓	
Structure	S1. Little risk management	✓	✓			✓	✓	✓	✓
	S2. Little incentive for innovation	✓		✓		✓	✓	✓	
	S3. Low accountability	✓		✓				✓	✓
	S4. Few DM processes	✓	✓	✓	✓	✓	✓	✓	✓
	S5. Silos	✓	✓	✓	✓	✓	✓	✓	✓
Mental Models	M1. Very Conservative			✓		✓	✓	✓	
	M2. No empowerment			✓		✓	✓	✓	✓

Moreover, decision-making was one of the lowest IQ element scores as discussed in section 4.1.1.3. Burgelman and Grove (1996) believe that the employees on the front lines of innovation are the ones most likely to find their company's best entrepreneurial opportunities as long as they have the responsibility and the power to do so. Few formal decision-making mechanisms existed as it was highly centralized within the family. Consequently, decision-making and accountability (also with a low score, as presented in section 4.1.1.3) are not part of the Company's culture, whereas they are important elements of an innovative organizational culture (Burgelman & Grove, 1996; Goodale et al., 2011; Rao & Weintraub, 2013).

During this study, several decision-making mechanisms to prioritize between innovation projects and manage the associated risks were being developed and implemented. There was no clearly articulated risk portfolio as it was highlighted with a low score for the 'Prioritize' element of the IQ questionnaire discussed in section 4.1.1.5. However, as the employees at different hierarchy levels were not used to taking responsibility, it led to a lot of decision avoidance because no one was ready to take the blame for the 'wrong' decision. The employees are afraid of failing as suggested by the IQ 'Failure OK' element discussed in section 4.1.1.1. Consequently, it seems 'safer' for many to prioritize work on existing orders as opposed to development projects. While some orders demand innovation and development, as they are tied to a customer and have to comply with high safety standards, the associated innovation possibilities are limited because the Company can't afford to fail (Christensen, 1997; Rao & Weintraub, 2013).

In addition, while processes are being implemented, the reward structures don't adapt to encourage new behaviours. Employee evaluations and reward systems play an important role in employee behaviour (M. H. Morris et al., 2006) and in the creation of an environment favourable to intrapreneurship (Kuratko, Hornsby, et al., 2014). The 'Reward' element of the IQ questionnaire was one of the lowest scores as discussed in section 4.1.1.6. In such a context, there is little incentive to go beyond day-to-day execution.

4.2.2 Execution Mindset

"We can do whatever we want as long as the day-to-day is taken care of" were the exact words used by one of the employees during an in-person IQ questionnaire interview. The employees have theoretical freedom to try whatever they want outside of their regular duties. However, there is no time, resources or incentives to go beyond their work description as supported by the low scores

of the ‘Projects’ factor and the ‘Reward’ element of the IQ questionnaire discussed respectively in sections 4.1.1.4 and 4.1.1.6. Moreover, the existing incentives encourage tangible outputs. The human resources are managed mainly for efficiency and return on investment, which is one of the traditional management practices harmful to Intrapreneuring according to Sykes and Block (1989). The employees being promoted are usually the ‘good soldiers’ who work hard and do what they are told. Thinking ideas through and developing something new often takes time before producing tangible outputs. There are no ways to report on such intangible work. Consequently, investing time in trying something new is a risky business, as one may be seen as doing nothing.

The beginning of the longitudinal study in 2015 coincided with the arrival of the first non-family President and CEO. His top mandate and priority for the first few years was to improve the Company’s operational efficiency. Significant resources were invested toward this goal, which is the focus of most on-going organizational changes. Few resources are left for the development of Innovation Capabilities. Consequently, innovation projects stretch out for too long, as evidenced by the low score of the ‘Launch’ and ‘Scale’ elements discussed in section 4.1.1.5. Yet, time availability is one of the five dimensions essential to an Intrapreneurial Corporate Culture according to Kuratko, Hornsby, et al. (2014). The recent operational focus reinforces the importance of operational incentives and KPIs in addition to new top management KPIs which focus mostly on quarterly financial performance. The observations collected regarding the employees’ execution mindset with sample quotes are summarized in Table 4.3. Their data sources are presented in Table 4.4.

4.2.3 Lack of Internal Alignment

As presented in Table 4.5 and Table 4.6, there is little alignment amongst different processes and across departments. The main innovation stakeholders – IRDT managers and director, VPs of Engineering and Marketing, as well as the CEO – all have different definitions of innovation, as well as differing ambitions regarding innovation and its role within the Company’s current and future success. This was confirmed by the low ‘Community’ element score as discussed in section 4.1.1.3.

Table 4.3: Levels of Perspectives Iceberg Regarding the Execution Mindset with Sample Quotes

Iceberg Level	Observations Regarding the Execution Mindset	Sample Quotes
Patterns	P1. Development projects' timelines stretch out for too long;	"Engineering staff design and test products that never make it out of the Company." – Design Engineer
	P2. A lot of firefighting;	"We are always pulled out of our development work to manage some emergency." – Engineering Manager
	P3. A lot of time spent in preparing presentations and reports.	"They always ask for nice power points for everything." – Engineering Director
	P4. Priorities	
	P4.1. Development projects are never a priority until a customer asks for it;	"Product Development is stuck behind the day-to-day." – Engineering Manager
	P4.2. Priority to clear and simple tasks, to what's "easier" to execute, often without figuring out if it's actually useful and how it fits within the Company's objectives and the bigger picture.	"A lot of fancy power points but not much gets done." – Engineering Director
Structure	S1. Operations-oriented KPIs;	"We are judged based on Average Days Late" – Engineering Manager
	S2. Little dedicated time to think / develop new initiatives, technologies, products…;	"Did you ever try to run in a swimming pool filled with maple syrup? We are always focused on orders, stretched thin, we do not have the resources." – VP
	S3. Little incentive to prioritize the future;	"Resistance is high and rewards are rare." – Engineering Manager
	S4. Little accountability in general, even less for anything that isn't day-to-day work.	"We should be working more on product development but it does not fit in my workload and it is not my call to make." – Engineering Manager
Mental Models	M1. 'Delivering now is more important than delivering the right things.' - Tangible work that allows one to produce specific deliverables, reports and power points is what is most valued. Consequently, employees work hard at delivering while not often taking the time to think through their work to make sure it creates real value.	"People ask a lot of questions, but often not the right ones." – Product Manager "We do the same things forever, it is easier." – Design Engineer
	M2. 'We are not masters of our choices, we must do what customers ask now.'	"We can do what we want, but the priority is always to work on sales orders." – Design Engineer
	M3. "We can do whatever we want as long as the day-to-day is taken care of." – No one gets punished for trying new things and there is even some encouragement to experiment. However, this is only acceptable when the day-to-day firefighting is taken care of. Unfortunately it never ends.	"When we are not overloaded, we can do what we want." – Project Specialist

Table 4.4: Levels of Perspectives Iceberg Regarding the Execution Mindset with the Data Sources

Level	Observations	Data Sources							
		Prior Data (phase I)	Document Review	Interviews	Workshops	IQ Questionnaire	Observations	Meetings	Fellow Researchers' Observations
Patterns	P1. Projects stretch out for too long;	✓		✓	✓	✓	✓	✓	✓
	P2. Firefighting;			✓	✓	✓	✓	✓	✓
	P3. Time spent reporting.			✓		✓	✓	✓	
	P4. Priorities	✓		✓	✓	✓	✓	✓	✓
	- P4.1. Development never a priority;	✓		✓	✓	✓	✓	✓	✓
	- P4.2. Priority to execution no matter the bigger picture.			✓			✓	✓	
Structure	S1. Operations-oriented KPIs;		✓				✓	✓	
	S2. Little dedicated time for development;			✓		✓	✓	✓	
	S3. Little incentive to prioritize the future;			✓	✓	✓	✓		
	S4. Little accountability for anything that isn't day-to-day work.			✓	✓	✓	✓	✓	
Mental Models	M1. 'Delivering now is more important than delivering the right things.'	✓		✓	✓		✓	✓	✓
	M2. 'We are not masters of our choices.'			✓			✓	✓	
	M3. "We can do whatever we want as long as the day-to-day is taken care of."			✓		✓	✓		

Table 4.5: Levels of Perspectives Iceberg Regarding the Lack of Internal Alignment with Sample Quotes

Level	Observations Regarding the Lack of Internal Alignment	Sample Quotes
Patterns	***P1. Values***	
	P1.1. Values of the Company are not well known;	"The only value I can remember is something about family spirit." – Engineering Manager
	P1.2. Employees report not knowing how to connect values with actions;	"We have some values with the new CEO but we do not really know what to do with them." – Engineering Manager
	P1.3. Employees don't prioritize what they say they value.	"Customer satisfaction is what really matters but we do not have resources to invest for the development of VoC methods this year." – VP
	P2. Gaps between words and actions	
	P2.1. A lot of complaints but little action;	"We are very vocal with complaints but not with solutions." – Project Specialist
	P2.2. Little coherence between words/appearances and actions/investment;	"We do not do enough of what has value." – Engineering Manager
	P2.3. Significant gap between what leaders say and do to support innovation.	"They ask us to innovate but they do not give us any resources to do so." – Engineering Director
	P3. Communication	
	P3.1 Poor communication in general within the Company;	"We need more collaboration, coordination, knowledge sharing, better communication and more development outside of the customer demands." – Design Engineer
	P3.2. Communication on Company objectives gets lost when going down the hierarchy;	"Communication down the hierarchy is difficult." – Product Manager
	P3.3. People claim they're making the effort to communicate and work with others while the others aren't doing their part;	"We try to reach out to them all the time but they do not care and do their work on their own." – Engineering Director
	P3.4. Regular miscommunication and misunderstanding.	"They keep talking about it but it is as if they are speaking different languages." – Product Manager
Structure	S1. No common innovation language;	"We never agree on what we think innovation should look like here." – Engineering Director
	S2. No adequate cross-functional mechanisms allowing stakeholders to align work and processes among teams and departments;	"We have some tools but we are having a hard time using them." – Product Specialist "We need to break silos and improve team work but it is difficult because of how the company was built: silo data bases and high age average. Some people absolutely do not want to work in teams." – Design Engineer
	S3. Reporting and work structures are typical silos where each individual, team and department focus on their specific jobs with no space nor resources for multidisciplinary work.	"A lot of functions are too stuck in the day-to-day work to be able to work efficiently with others." – Product Manager "Teamwork is probably one of our biggest weaknesses." – VP
Mental Models	M1. 'I am doing my job, which is more important than the rest, and others just don't get it.'	"Many keep information to themselves." – Design Engineer
	M2. Some employees think that Company values and related talk and actions are just fluff to make the Company look good, while they don't mean anything in regards to the 'real' work to be done.	"The VPs make us waste our time with all this fluff, we have some real work to do." – Engineering Director

Table 4.6: Levels of Perspectives Iceberg Regarding the Lack of Internal Alignment with the Data Sources

Level	Observations	Data Sources							
		Prior Data	Document Review	Interviews	Workshops	IQ Questionnaire	Observations	Meetings	Fellow Researchers' Observations
Patterns	***P1. Values***			✓		✓	✓	✓	
	- P1.1			✓		✓	✓		
	- P1.2			✓		✓		✓	
	- P1.3					✓	✓	✓	
	P2. Gaps between words and actions			✓		✓	✓	✓	
	- P2.1					✓	✓	✓	
	- P2.2					✓	✓	✓	
	- P2.3			✓		✓	✓	✓	
	P3. Communication	✓		✓	✓	✓	✓	✓	✓
	- P3.1	✓		✓	✓	✓	✓	✓	✓
	- P3.2			✓	✓	✓	✓	✓	✓
	- P3.3			✓	✓	✓	✓	✓	✓
	- P3.4			✓	✓		✓	✓	✓
Structure	S1. No common innovation language;	✓	✓	✓	✓	✓	✓	✓	✓
	S2. No adequate cross-functional mechanisms;	✓		✓	✓	✓	✓	✓	✓
	S3. Reporting and work structures are siloed.	✓		✓	✓	✓	✓	✓	✓
Mental Models	M1. 'I am doing my job, which is more important than the rest, and others just don't get it.'			✓			✓	✓	
	M2. Company values are just fluff.			✓		✓	✓		

Moreover, the IRDT group is under Engineering. The purpose of a typical Engineering group such as it is in this Company is to 'play it safe', comply with standards and use the most proven technologies available. In contrast, an innovation group should be experimenting with new technologies and ideas, and taking risks. This creates a conflictual situation where IRDT is forced to 'play it safe,' whereas in order to innovate they should be experimenting, failing sometimes and learning in order to discover new ways of doing things.

High management support is a key characteristic of intrapreneurial companies (Burgelman, 1984; Kuratko, Hornsby, et al., 2014; Ling et al., 2008; Rao & Weintraub, 2013; Tellis et al., 2009). While everyone at the Company claims that innovation is important and that there must be more time to develop new ideas, there are little top management actions and investment to make it possible. This gap was visible through the 'Behaviours' block scores discussed in section 4.1.1.2 and the 'Trust' element in section 4.1.1.3. In addition, there are no innovation indicators among the 10 executive scorecard KPIs, reflecting the absence of innovation in the Company's strategy. Many authors state that, to be successful, intrapreneurial activity must be integrated into the company's strategy (Burgelman, 1983a; Goodale et al., 2011; Kuratko, Hornsby, et al., 2014).

According to Rao and Weintraub (2013), "values of a company are less what leaders say or write than what they do & invest in". The real values drive the priorities and decisions; they are reflected in how time and resources are spent. Such evidence of inconsistent messages contributes to a general low performance context as it is difficult to have enough trust, focus and ambition (Gibson & Birkinshaw, 2004). Besides showing a gap between words and actions, this also supports the importance of the Execution Mindset discussed in the previous section.

In addition to the lack of strategic (vertical) alignment, synergistic work among peers (horizontal alignment) is missing. The Company is managed functionally, which is one of the traditional management practices harmful to Intrapreneuring according to Sykes and Block (1989). As one employee mentioned while referring to the 'Teamwork' element statement during his IQ questionnaire interview: "teamwork is one of our biggest weaknesses" (see section 4.1.1.3). Team work is one of the key characteristics of an intrapreneurial culture (Kuratko et al., 1993).

According to Rao and Weintraub (2013), "most innovations happen within a community, and the core of any community is a common language". The lack of a common innovation language at the Partner Company makes it difficult for employees from different departments, such as Engineering

and Marketing, to understand the value that other departments can bring. This lowers the chances of having a productive conversation and work environment, as well as a good learning experience together. As portrayed by the ‘Communication’ and ‘Space’ element scores (see section 4.1.1.4), there is a lack of structures and spaces for cross-functional work resulting in little successful multidisciplinary work which is highly desired for innovation (O'Reilly III & Tushman, 2004; Saunila, 2016; Sykes & Block, 1989). Even functional teams prefer individual work.

4.2.4 Lack of Environmental Alignment

A more recent employee, with significant previous management experience, mentioned during an interview that “when you enter this Company, you enter a bubble”. Besides little internal communication and alignment, there seems to be even less understanding and synergy with the systems within which the Company operates. In the IQ questionnaire there are a few questions on how the customers perceive the Company (see section 4.1.1.6). Many employees were surprised to realize that they had no idea. Moreover, the ‘Iterate’ element regarding the efficiency of feedback loops with customers was the lowest score of the questionnaire (see section 4.1.1.5).

Moreover, a disproportionally high amount of development and R&D resources are being used for projects that focus on bringing the products up to standards. As expressed by several employees on numerous occasions, they are currently – and have been for several years – in “catch-up mode”. The Company is not evolving quickly enough to meet future needs and is not sufficiently leveraging its relationships with suppliers and vendors, as evidenced by the low ‘Ecosystem’ element score discussed in section 4.1.1.4. Observations on the lack of Environmental Alignment along with sample quotes are presented in Table 4.7. The data sources for each observation are presented in Table 4.8.

4.3 Analysis of the Innovation Process Maturity

The four observation categories presented in section 4.2 represent four of the five key challenges met during the development of innovation KPIs for the Company. The fifth challenge is the low process maturity of the innovation processes.

Table 4.7: Levels of Perspectives Iceberg Regarding the Lack of Environmental Alignment with Sample Quotes

Iceberg Level	Observations Regarding the Lack of Environmental Alignment	Sample Quotes
Patterns	P1. Little communication with customers for anyone except sales;	"Only a few people talk to customers." – Project Specialist
	P2. The Company is in catch up mode regarding product development, compared to industry standards and competition;	"We are very far from some competitors on some subjects." – Product Manager
	P3. Many employees have no idea about how customers view the Company;	"That is a very good question, I really have no idea what customers think of us." – Product Manager
	P4. The Company is not evolving quickly enough to meet future needs.	"We cannot even keep up with standards compliance work." – Engineering Manager
Structure	S1. Few feedback loops with customers;	"The only ones who talk to customers are the sales people and the only time they bring us to the table is for troubleshooting." – Engineering Director
	S2. Sales incentives encourage more commodity sales as opposed to innovative products;	"Sales people do not want to sell new products, it is not as profitable for them." – Engineering Director
	S3. Company high level KPIs mainly ask for short term objectives such as quarterly sales and OTD;	"We are always under the pressure to deliver on the quarterly objectives." – Engineering Director
	S4. Little external feedback loops and input regarding new products as well as future development and needs.	"Commercial margins are more important than relationships which are not capitalized on." – Engineering Manager
Mental Models	M1. Many employees believe that the Company is currently surfing on its reputation; "We have been doing it the same way for a few decades, why should we change now."	"We are surfing on our past reputation." – Engineering Manager "For 50-60 years, the mentality was 'Whatever you do, make sure it does not affect the production lines'." – Engineering Manager
	M2. "Our industry is very specialized and nothing outside it can disrupt it."	"The nature of our industry is very heavy, everyone's mentality has to change." – Engineering Manager
	M3. "Change in manufacturing is very slow, we will see it coming."	"It is a very mature industry, we cannot be too innovative." – Engineering Manager

Table 4.8: Levels of Perspectives Iceberg Regarding the Lack of Environmental Alignment with the Data Sources

Level	Observations	Data Sources							
		Prior Data	Document Review	Interviews	Workshops	IQ Questionnaire	Observations	Meetings	Fellow Researchers' Observations
Patterns	P1. Little communication with customers;	✓		✓	✓	✓	✓	✓	✓
	P2. Catch up mode;			✓		✓	✓	✓	✓
	P3. No idea about how customers view the Company;				✓	✓	✓		✓
	P4. Not evolving quickly enough.			✓		✓	✓	✓	✓
Structure	S1. Little feedback from customers;		✓	✓	✓	✓	✓	✓	✓
	S2. Sales incentives encourage commodity sales;	✓		✓	✓				
	S3. High level KPIs focus on short term;		✓				✓	✓	
	S4. Little external feedback loops.		✓		✓	✓	✓		✓
Mental Models	M1. Surfing on past reputation;			✓	✓	✓	✓		✓
	M2. "Our industry is very specialized and nothing outside it can disrupt it."			✓	✓		✓	✓	
	M3. "Change in manufacturing is very slow."			✓			✓	✓	

Röglinger, Pöppelbuß, and Becker (2012) reviewed ten business process management (BPM) maturity models. A fellow field researcher present at the Company during phase II reviewed the ten models and found that, in general, the models exhibit 5 levels of process maturity which describe the state of the process and its components and tools (Houllier, 2017). Based on the examined models, he identified the typical characteristics of each level as presented in Figure 4.15.

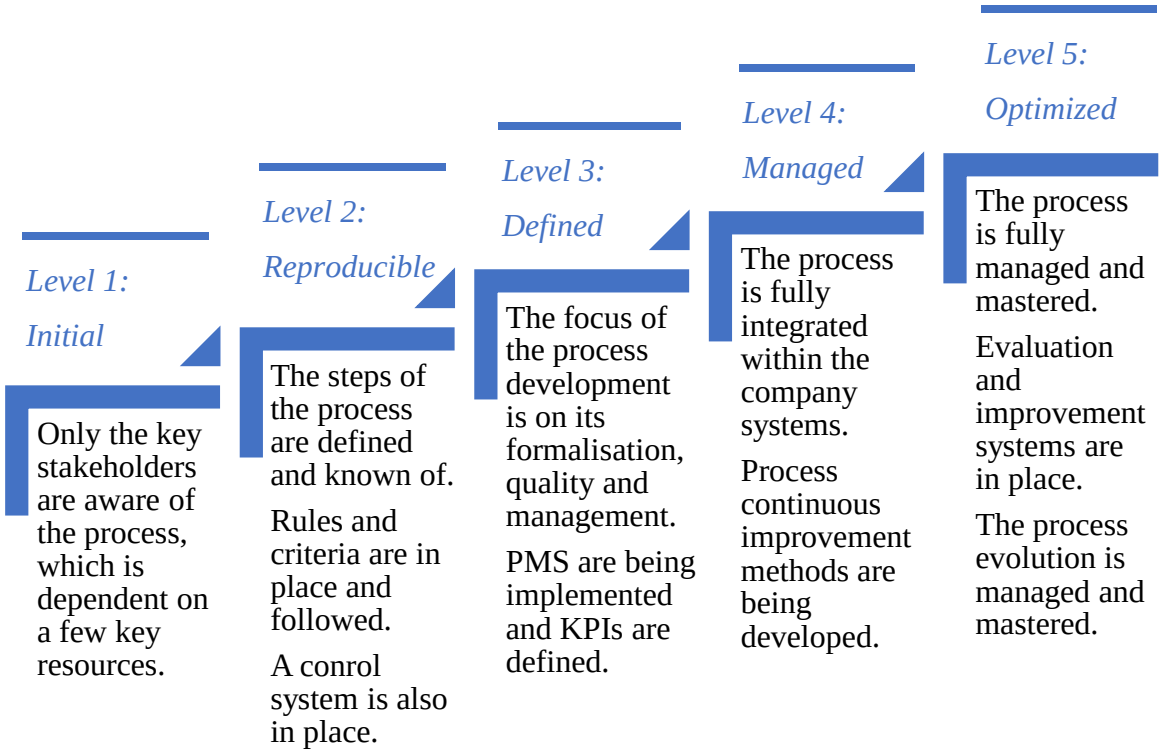

Figure 4.15: Summary of Key Characteristics Common to 10 Selected BPMs

As part of his study, Houllier (2017) established that, in general at the time of this study, the innovation processes in place at the Company were between maturity levels 1 and 2. The following characteristics regarding the groups and processes involved with innovation explain this classification:

- Lack of structure;
- Entire dependency on key resources;
- Little process visibility outside of IRDT or marketing;
- Tools are not well integrated with the processes or uniformly applied;

- Little senior management exposure;
- Little alignment with other processes and departments.

'Processes' was also the lowest of the six building block scores of the IQ questionnaire as discussed in section 4.1.1.5. According to the analysis by Houllier (2017) and as presented in Figure 4.15, KPIs are typically developed at maturity level 3. The Company's innovation processes being at a lower maturity level, this contributes to the difficulties of developing KPIs to measure innovation success. More work must be done on innovation processes and teams to rise the maturity level before being able to effectively work on innovation KPIs.

4.4 Key Challenges to Rejuvenating Innovation Capabilities through Innovation KPI Development

The four iceberg categories presented in section 4.2 and the low process maturity discussed in section 4.3 inhibited the successful development of innovation KPIs at the Partner Company. This is explained in more detail in the following paragraphs and summarized in Table 4.9.

During various discussions with the key stakeholders on what kind of innovation KPIs would be the most relevant to evaluate the success of the Company's innovation endeavours, there was interest in intangible KPIs that would allow to evaluate experimenting, learning and professional development of the employees. However, when it was time to decide which KPIs to prioritize for implementation, there was an urgency for execution-oriented ones, reflecting the dominant execution mindset discussed in section 4.2.2. There was an explicit ask to start with KPIs that are easy to measure – these focus on quantifying the current innovation activities and not on the results. While the number of ideas and innovation projects can be a useful indicator, it doesn't account for the quality of the ideas and their potential for an actual commercial success and financial returns (Acs & Audretsch, 1987; Busby & Williamson, 2000; Griliches, 1990; Tellis et al., 2009; Von Hippel, 2005; Werner & Souder, 1997). A pattern that emerged from these observations is that *the execution-oriented culture seems to have a significant influence on the kind of KPIs that can be developed and accepted.*

Table 4.9: Overview of Key Challenges to Innovation KPI Development at the Partner Company

Key Challenge	Overview of the challenge at the Partner Company	How it inhibits development of innovation KPIs	Supporting References
Risk Aversion	Innovation requires testing, risk and some failure before breakthrough. The employees exhibit a risk averse behaviour prioritizing projects with a guarantee to sell today.	Resistance to output KPIs that could show ultimate innovation results a few years later as well as to soft KPIs that could be drivers of innovation. Priority to input and hard KPIs which do not allow one to measure the actual success of innovation endeavours.	Christensen (1997); Christensen and Raynor (2003); M. H. Morris et al. (2006); Rao and Weintraub (2013); Tellis et al. (2009)
Execution Mindset	Innovation requires stepping out of the day-to-day execution and making time and space to think and test some ideas out. There are few dedicated resources for innovation, which in any case mostly get pulled back to day-to-day emergencies.	The execution mindset asks for innovation KPIs that showcase execution of innovation, such as number of ideas and development projects. These do not encourage activities essential to the development of innovative capabilities.	Busby and Williamson (2000); Kuratko, Hornsby, et al. (2014); Pinchot III (1985); Rao and Weintraub (2013)
Lack of Internal Alignment	The lack of alignment does not allow for synergy with existing systems nor for efficient ways to develop cross functional metrics.	There is no vertical nor horizontal agreement on the kind of KPIs the key stakeholders want to have.	Kaplan and Norton (1992); Kuratko, Covin, et al. (2014)
Lack of Environmental Alignment	The Company is not set up to meet future needs as there is a lack of feedback loops with customers and most development efforts aim only to catch up to the standards and competition.	Disconnect with other stakeholders in the industry makes it difficult to have a good understanding of what success would mean, and what should be measured and how.	Atkinson et al. (1997); Christensen (1997); Dewangan and Godse (2014); Godener and Soderquist (2004); Neely, Adams, and Kennerley (2002), Ries (2011)
Low level of Process Maturity	Both groups mostly involved with innovation at the time of this study, the IRDT group and the marketing department, are new entities being structured with new processes being developed. The groups and innovation processes are not structured enough to be able to effectively develop KPIs.	The average maturity level of innovation processes at the time of study was between 1 and 2 while KPIs are normally developed at level 3. Other work needs to be done on the development of processes and teams before innovation KPIs can be effectively developed and implemented.	Rohloff (2009), Röglinger et al. (2012)

There is a clear preference for input KPIs, illustrating the Company's short-term thinking. This does not leave time and space for activities and development that account for aspects crucial for innovation and take significant time to show results, such as learning (Kaplan & Norton, 1992; Ries, 2011). Another pattern emerges: *With little KPIs encouraging longer term endeavours and development, learning and experimenting are not valued enough to gain sufficient importance within the Company's culture.*

In addition to the urge for KPIs that are easy to measure immediately, different stakeholders have different KPI preferences and have little interest in the indicators the others want to see. This lack of internal alignment might be a consequence of the lack of environmental alignment, as all Company internal stakeholders have different opinions on what customers really want and need. This is reflected in the following pattern: *Little synergy and alignment regarding innovation within the Company often cause counterproductive work in respect to innovation.*

No one agrees on which KPIs would help them better evaluate the success of their innovation endeavours. In a Company where employees generally do not want to take responsibility, this results in a lot of decisions bouncing back and forth between the main stakeholders. This often ends up in asking for what is simpler. However, as established by Werner and Souder (1997), the simple metrics are rarely the useful ones.

According to the ten BPM models reviewed in section 4.3, the level of maturity typically required for effectively establishing KPIs is 3. Consequently, with the teams and structures not being well established, nor well aligned among themselves or with the Company's strategy, it is difficult to develop effective ways to measure their work and accomplishments in respect to innovation.

The four categories presented in section 4.2 establish that the Company has an execution-oriented culture with execution-oriented PMS. These characteristics, supported by the results of the IQ questionnaire, contributed to the challenges of developing KPIs favorable to innovation.

4.5 Summary of Deductions with Regards to the Guiding Questions

Deductions regarding each of the research guiding questions were made based on the observations and the memoing process explained in section 3.2.4. Through sorting of memos, integration with existing literature, and conceptualization at a higher level, these deductions resulted in four propositions. The deductions and propositions are presented in this section.

4.5.1 Deductions Regarding Guiding Questions 1 and 2

The first two guiding questions explore the interrelations between Corporate Culture, PMS and Innovation Capabilities:

> GQ 1: What are the dynamic relationships and mutual reinforcement mechanisms between a company's Culture and its PMS?
>
> GQ 2: How do the specific contexts created by the combinations of Culture and PMS influence, improve or deteriorate the company's Innovation Capabilities?

One of the main barriers to the implementation of innovation KPIs at the Partner Company was the lack of alignment of the innovation activities with the Company's strategic priorities and among the main innovation managers, as explained in section 4.2.3. Kuratko, Covin, et al. (2014) purport that a lack of coherent coordination between managerial roles is one of the biggest reasons innovation strategies fail in organizations. Moreover, absence of coherence between the culture and the PMS hinders innovation strategies (Kuratko, Covin, et al., 2014).

Furthermore, for innovation success it is important that the individual evaluation and reward systems are aligned with an innovation strategy (Hornsby et al., 2009). As employee performance evaluations influence their daily choices, these actions eventually create the Company's culture. Appropriate evaluation and reward systems are lacking at the Company as assessed in section 4.1.1.6.

Hence, when the Company is not committed to innovation which is not even part of the executive KPIs, there are few resources available for the development of Innovation Capabilities. Inversely, if an execution-oriented company would commit to innovation, important barriers could be lifted and resources deployed toward innovation needs. This leads to our **first proposition**.

> *Proposition 1: If an established execution-oriented company has innovation oriented strategic objectives and implements PMS and reward systems aligned with such objectives, this could stimulate innovation initiatives and support the future development and deployment of Innovation Capabilities and of an Intrapreneurial Culture.*

An organization's culture is reflected in its employees' actions and behaviours and is visible through the investment of its leaders more than their words (Rao & Weintraub, 2013). While many leaders verbally endorsed the importance of innovation, the results of the IQ questionnaire highlight that there is a gap between leaders' encouragement and actual coaching and support of innovation work (see section 4.1.1.2). Employees sometimes spend time discussing and developing new processes and tools but when it is time to implement a new method or change an existing practice, they often resist and revert back to the old ways. At the Company, the execution mindset showed even in the types of KPIs that the employees were ready to move forward with. This type of clash was also witnessed with other innovation management implementation projects throughout the phase I and phase II of the longitudinal research (Brodeur et al., 2017) and is rooted in a long established execution mindset. The execution mindset is the core category that emerged from the field observations and has an important influence on what can or cannot be done at the Company. Consequently, it has an impact on the KPIs that can be developed, as mentioned in a pattern discussed in section 4.4. This leads to our **second proposition.**

> *Proposition 2: Within a company with an execution-oriented culture, employees are likely to resist implementation of innovation initiatives and measures, and prioritize execution-oriented KPIs, even to measure innovation, further reinforcing the execution-oriented culture and impeding the development of Innovation Capabilities.*

4.5.2 Deductions Regarding Guiding Questions 3 and 4

The third and fourth guiding questions explore the Role of PMS in building Innovation Capabilities:

> GQ 3: What kind of PMS is more appropriate to stimulate Innovation Capabilities in an established company?
>
> GQ 4: How could PMS reinforce or kill the seeds of the Intrapreneurial Culture needed to foster long-term Innovation Capabilities?

Since “what you measure is what you get” (Kaplan & Norton, 1992), if one wants innovation, one must measure aspects that are aligned with and support innovation. The Partner Company’s existing PMS as well as the KPIs that were favored for innovation are mainly made of indicators that measure simple inputs and outputs. Focused on the “what”, such KPIs encourage short-term goals and execution, consistent with the Company’s execution-oriented culture.

On the other hand, innovation requires time, investment and testing. However, its success is not a function of these parameters. It depends more on a combination of luck, skillful and visionary employees, and a good opportunity with good timing. These are intangible and hard to measure; they have more to do with “how” things are done within the Company than with “what”.

The criteria that are used to evaluate the employees’ performance influence their everyday work and decisions. Consequently, when their performance evaluation focusses more on the “what”, they are not likely to prioritize work that requires them to take time to learn and experiment before delivering tangible results, as discussed in one of the patterns presented in section 4.4. Thus, an execution-oriented PMS can hinder the development of Innovation Capabilities as it discourages the behaviours required to create a prosperous environment for innovation.

At the Partner Company, it was possible to observe a close relationship between the existing PMS and the employees’ behaviours. While many expressed interest in different practices, few were ready to invest their time on things that were not formally recognized through an existing Company performance indicator. In the context of low innovation process maturity and without the possibility to truly align the KPIs with the organization’s high level strategy, it was difficult to develop meaningful and useful KPIs to measure the performance of constantly changing innovation processes.

McAdam and Keogh (2004) highlight that “the measures are not an end point [… they] must be continually reviewed and developed during the transitional period when creativity and innovation is [sic] developed”. The KPI development project was part of a longitudinal research aiming to help the Partner Company rejuvenate its Innovation Capabilities and develop its innovation management. To achieve this goal, it was decided to focus on transitional KPIs that will encourage the behaviours favorable to the development of Innovation Capabilities, rather than KPIs to measure the innovation performance. It is hypothesized that better innovation processes will

eventually result in an improved innovation performance (Kaplan & Norton, 1992). This leads to our **third proposition**.

> *Proposition 3: In an execution-oriented culture, it is more effective to develop KPIs to stimulate behaviours that are hypothesized to develop Innovation Capabilities, rather than KPIs to measure the success of innovation endeavours.*

4.5.3 Deductions Regarding Guiding Question 5

The last guiding question explores the Role of Organizational Culture in building Innovation Capabilities:

> GQ 5: What dimensions of an Intrapreneurial Culture are most important to implement or change in order to stimulate Innovation Capabilities?

An Intrapreneurial Corporate Culture allows for space and resources to explore new ideas (Clark & Fujimoto, 1991; Kuratko, Hornsby, et al., 2014; Kuratko et al., 2012; Pinchot III, 1985) while an execution-oriented one dictates short term tangible deliverables and priorities leaving little opportunity for long-term development (Lakiza & Deschamps, 2018; Lakiza et al., 2017). In addition, an intrapreneurial company provides support for innovation and new initiatives (Kuratko, Hornsby, et al., 2014), often letting them temporarily bypass the formal management systems (Pinchot III, 1985).

The role of the organizational culture in establishing or rejuvenating Innovation Capabilities is in giving value to innovation so it becomes a priority that guides day-to-day thinking and the development of supporting systems, processes and tools. Several cultural dimensions hindering the Company's Innovation Capabilities were observed at the partner Company:

- Risk-aversion;
- Lack of intrapreneurial support;
- Lack of dedicated innovation resources, space and time.

These dimensions have to be addressed in order to stimulate innovation within an execution-oriented culture and contribute to the development of an Intrapreneurial Culture. This can be done through behaviour change as further discussed in Chapter 5.

Innovation performance measurement is idiosyncratic to the organizational context and projects (Bremser & Barsky, 2004; Brophey et al., 2013; Brophey & Brown, 2009; Godener & Soderquist, 2004; Griffin & Page, 1996; Jiménez-Zarco et al., 2006). While it was assessed that the Company was not ready for KPIs to measure its innovation success at the time of the mandate, if the organization goes through a cultural shift and strengthens its innovation processes, the context will be different. Numerous authors believe that PMS can contribute to higher innovation effectiveness (Cooper & Edgett, 1996; Griffin, 1997; Hart et al., 2003; Jiménez-Zarco et al., 2006; Marginson, 2002; Neely et al., 2000; Neely et al., 1997). In a new context, more favourable to and trusting of innovation initiatives, the introduction of KPIs to measure innovation success might be the next right step to increase innovation performance by providing guidance on where improvement is possible (Jiménez-Zarco et al., 2006; Neely et al., 2000). Indeed, the name of level 3 (Defined) in the process maturity model presented in Figure 4.15 suggests that the processes must be defined at the time of KPI introduction. The model focuses on KPIs to measure performance of a Company's processes. This leads to our **fourth proposition**:

> *Proposition 4: When innovation and intrapreneurship are a strong part of the Company's culture and are accompanied by sufficiently mature (level 3 or more) innovation management processes, the successful and effective implementation of KPIs to measure the performance of innovation endeavours will be more likely.*

4.6 Conceptual Framework

A conceptual framework is not a tested theory. It is a set of concepts and connections organized coherently to help people understand how something takes place, and give direction to a study of empirical problems (Saunila, 2016). A conceptual framework was developed by integrating high level reflections from memoing, propositions 2, 3 and 4 presented in section 4.5, and knowledge from literature. The framework is presented in Figure 4.16 and explained in detail in the following paragraphs.

The **Execution Zone** of the framework (box 1 on Figure 4.16) results from the study's core category, the execution mindset, presented in section 4.2.2. This zone is characterized by the combination of an execution-oriented culture with execution-oriented PMS. The ***execution-oriented culture*** is defined as "a reactive, stagnant and risk averse culture where day-to-day

operations are prioritized over long term development" (Lakiza & Deschamps, 2018). The ***execution-oriented PMS*** facilitate "effective outcomes, where these outcomes include risk reduction, elimination of uncertainty, highly efficient operations, goal conformance, and specific role definitions" (M. H. Morris et al., 2006).

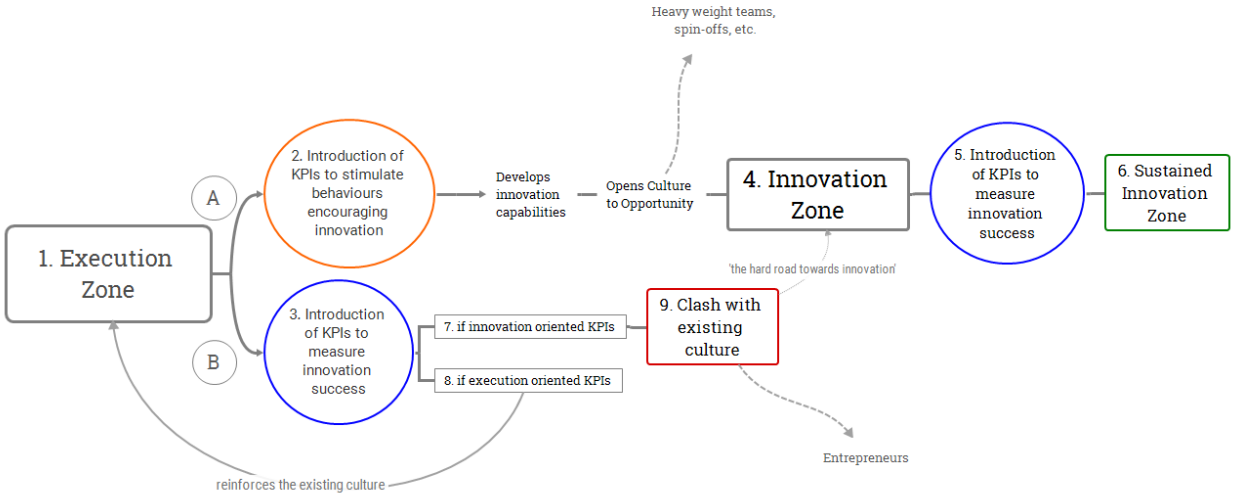

Figure 4.16: Proposed Conceptual Framework

The **Innovation Zone** of the framework (box 4 in Figure 4.16) is characterized by the combination of an Intrapreneurial Culture with innovation-oriented PMS. This zone is mainly defined through knowledge from literature. The Intrapreneurial Culture is defined as an environment where each employee can seize the opportunity to put to work their intrapreneurial potential (Kuratko, Hornsby, et al., 2014). The ***innovation-oriented PMS*** encourage initiatives and continuous learning, and focus on intangible aspects, objectives, strategy and forecasting of future processes.

A successful path from an Execution Zone (box 1 on Figure 4.16) to the Innovation Zone (box 4 on Figure 4.16) is a key concern of this study with the interest being to understand how to rejuvenate the Innovation Capabilities of an established execution-oriented Company. In the context where the rejuvenation path goes through the introduction of new KPIs into the existing company's PMS, KPIs with at least two different goals can be considered as shown in the framework. The two paths are differentiated by what they are meant to do: govern employees' behaviours (path A) or measure achievement and output (path B) (Cirka, 1997). While the path B is what the Company initially asked for, Proposition 3 suggests that path A is more effective. These

paths are represented by the two choices at the left of the framework: Introduction of KPIs to stimulate behaviours encouraging innovation (box 2 in Figure 4.16) vs Introduction of KPIs to measure innovation success (box 3 in Figure 4.16). This choice is presented in Figure 4.17.

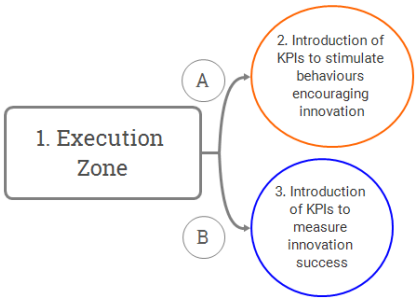

Figure 4.17: Two Possible Paths of Innovation KPI Introduction in Execution-oriented Culture

Path A: Introduction of KPIs to stimulate behaviours encouraging innovation

As "what you measure is what you get" (Kaplan & Norton, 1992), if KPIs that are meant to stimulate behaviours conducive to innovation are introduced, this should contribute to the development of Innovation Capabilities. Knowledge from literature suggests that the new behaviours will contribute to transforming the company's culture, opening it to opportunities and more flexibility. This could imply the creation of heavy-weight teams and spin-offs. Ultimately, this road will bring the company to the Innovation Zone. This portion of path A (added to Figure 4.17 as presented in Figure 4.18) is mainly inspired by knowledge from literature.

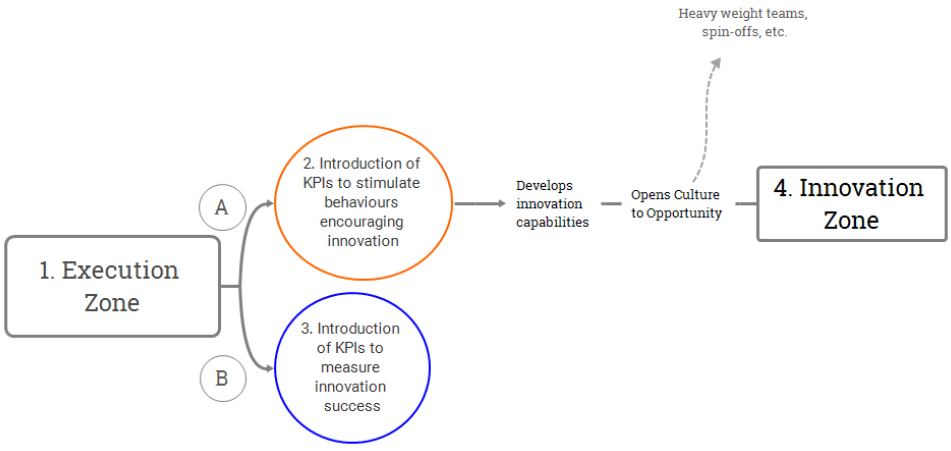

Figure 4.18: The Path toward the Innovation Zone

Once in the innovation zone (box 4), it will be easier to introduce KPIs to measure the success of innovation work as suggested by Proposition 4. Introducing such KPIs in an Intrapreneurial Culture with sufficiently mature innovation processes will help formalize the innovative practices to ensure that they become part of the company's long-term legacy, leading to a sustained innovation zone (box 6). Path A is thus completed and presented in Figure 4.19.

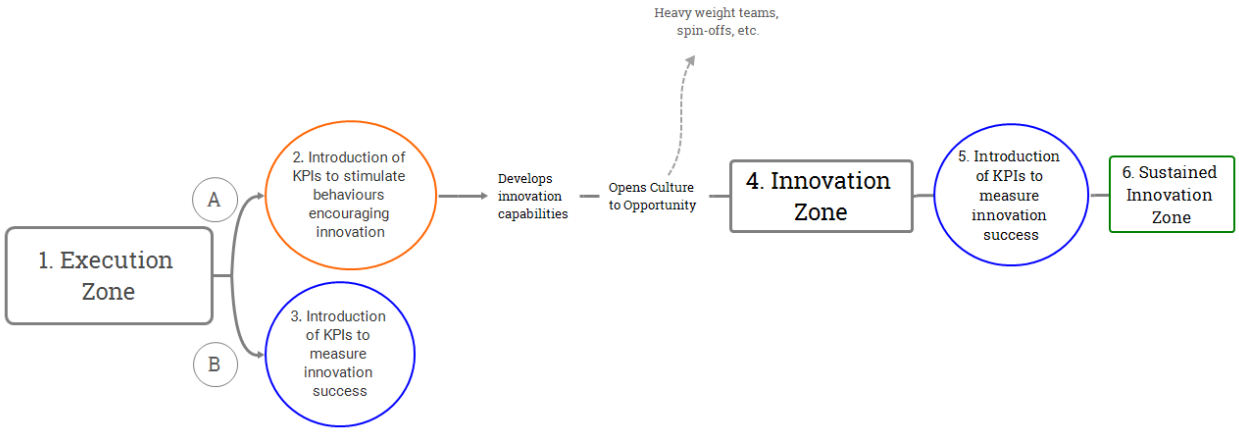

Figure 4.19: Completion of Path A toward the Sustained Innovation Zone

Path B: Introduction of KPIs to measure innovation success

Direct introduction of KPIs to measure innovation performance in an execution-oriented culture can be done in at least two ways. First, strongly imbedded in the execution mind-set, execution-oriented KPIs (box 8) can be chosen even to measure innovation. This was experienced during numerous discussions about innovation KPIs at the Partner Company as discussed in section 4.4. Such KPIs will further reinforce the execution-oriented culture, failing to develop Innovation Capabilities as suggested by Proposition 2. This is presented by the addition of a sub-path to path B as presented in Figure 4.20.

On the other hand, risky intrapreneurs within the company could try to introduce innovation-oriented KPIs (box 7). This effort is likely to clash with the company's culture (box 9 on Figure 4.16) as it happened at the Partner Company and is discussed in section 4.5.1. This is likely to discourage the intrapreneurs over time. When fighting for too long within a rigid environment, many intrapreneurs give up and leave to become entrepreneurs, as has been documented in numerous cases (Pinchot III, 1985). However, they could be persistent and eventually win the fight

toward the innovation zone (box 4). This is what we call ‘the hard road toward innovation’ as presented in the framework. This completes the framework presented in Figure 4.16.

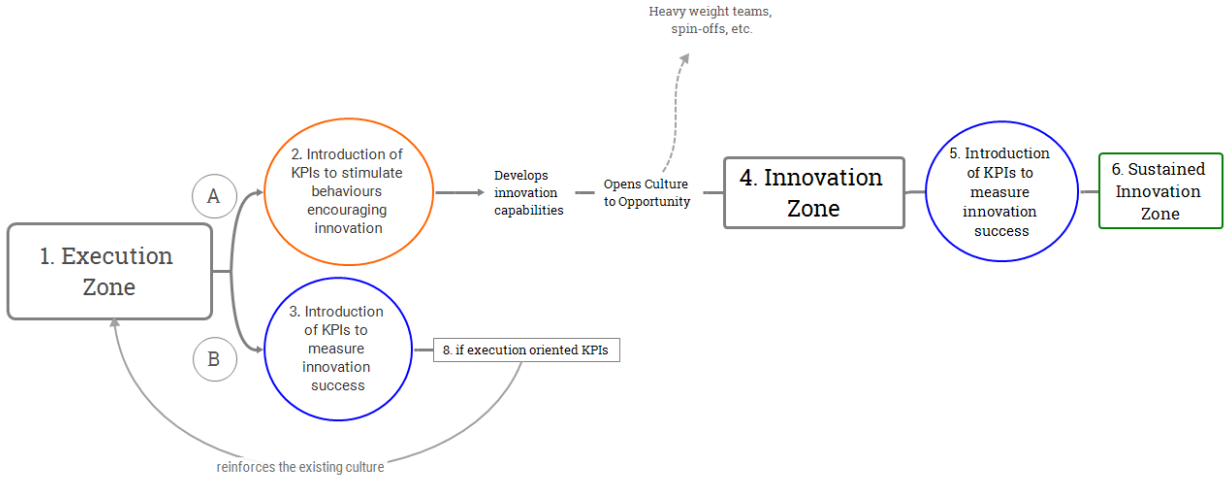

Figure 4.20: Introduction of Execution-oriented KPIs to Measure Innovation Success

Two versions of the complete framework showing how each of the three propositions fit within the framework are presented in Appendix G.

CHAPTER 5 CONCLUSION

Given the Partner Company's culture and structure, the fact that innovation efforts and innovation management processes were challenging to carry out was not surprising. Indeed, the Company has a 'functional designs' organizational design that implies the integration of project teams into the existing organizational and management structure (O'Reilly III & Tushman, 2004). In their investigation of 35 companies attempting to succeed in innovation, O'Reilly III and Tushman (2004) found that only 25% of the 7 companies with the same design succeeded compared to 90% of the 15 companies with an ambidextrous organization.

This chapter provides conclusions in section 5.1. A hypothesis and areas for future research are proposed in section 5.2. Section 5.3 completes this thesis by discussing the limitations of this study, and its contributions to academia and practice.

5.1 Discussion

Following the challenges met during the innovation KPIs implementation project at the Partner Company, three prerequisites to such projects were identified and are discussed in section 5.1.1. The challenges of culture change are discussed in section 5.1.2.

5.1.1 Prerequisites to a Successful Implementation of KPIs to Measure Innovation Success

As explained in Chapter 4, the low BPM maturity level of the Company's innovation processes was a major challenge in the development of KPIs to measure the success of innovation endeavours. This led to re-orient the project toward the development of KPIs with the goal to encourage behaviours conducive to innovation instead of KPIs with the goal to measure innovation success. Execution-oriented companies such as our Partner Company rarely prioritize innovation management projects over everyday operations sufficiently for it to be worthwhile. Hence, when the maturity level is too low, investment in the development of KPIs to measure innovation success might not be the best use of time. This led to Proposition 3 presented in section 4.5.2. Thus, based on the Case Study in the Partner Company, it is recommended to assess a company's BPM maturity level of innovation processes before deciding what type of innovation KPIs to implement and most importantly with what goal in mind. This results in our **first conclusion**:

The innovation processes maturity is a prerequisite to a successful implementation of KPIs to measure innovation success.

Moreover, as detailed in section 4.4, the lack of strategic alignment, internal as well as environmental, also significantly hindered the effective development of innovation KPIs at the Partner Company. The innovation KPI development project was not directly aligned with the Company's strategy and was not an executive priority. Moreover, in an execution-oriented culture, a process development project is rarely a priority. In such circumstances, PMS implementation projects often end up half completed, and the KPIs are used incorrectly or even dropped (Garengo et al., 2005). Similar efforts become even more challenging in the future as stakeholders might have lost faith in these types of projects. Combined with the lack of alignment between the main innovation stakeholders (Engineering and Marketing departments), the decision-making regarding this project lagged. This was exacerbated by the fact that, with little connection to the external stakeholders, no one felt sufficiently confident about their innovation performance and needs. It is difficult to achieve high performance when the different parts of the Company are not working together in synergy (Kaplan & Norton, 1992). This results in our **second conclusion**:

Strategic alignment is a prerequisite to the successful development of innovation KPIs.

The remaining two challenges presented in section 4.4 were risk-aversion and an execution-mindset that are deeply rooted in the Company's culture. In this strong execution context there was no sufficient commitment to innovation over the day-to-day firefighting. Indeed, innovation was the priority of very few people and none of them had significant decision making power. Even the people primarily assigned to innovation were constantly pulled out of their development projects to respond to improvement requirements on customer orders. Important resources were provided by upper management to improve operational excellence while IRDT was struggling to justify dedicated resources for innovation. Without commitment, development projects are stretched and delayed making them inefficient and sometimes obsolete by the time they are done. This results in our **third conclusion**:

Commitment to innovation is a prerequisite to the successful development of innovation KPIs in an execution-oriented company.

The interaction between these three conclusions results in our **fourth conclusion**:

The three prerequisites presented in this section influence one another. The resources required to develop and solidify processes are more easily available when what they are asked for is fully aligned with the company's strategy. Innovation management efforts are easier to align with the company's strategy when the company is committed to innovation which is itself part of its key objectives (Lakiza & Deschamps, 2018).

5.1.2 How is it Possible to Change an Organizational Culture?

"Culture is thought to be too big to ignore, too tough to conquer, and too soft to understand" (Katzenbach & Harshak, 2011). Culture is uniquely human and it develops slowly (Katzenbach & Harshak, 2011; Tellis et al., 2009). Moreover, "culture is difficult to observe, measure, and develop" (Tellis et al., 2009). So how is it possible to change it?

Successful examples of culture change toward more innovative capabilities are all unique and idiosyncratic to the context (Rao & Weintraub, 2013) so they cannot be easily transported across firms (Tellis et al., 2009). Many people who do not know how to go about culture change without clear guidelines and steps, try to ignore it. This was the case for some executives at the Partner Company who did not believe that it was possible to change their culture. They were trying to change the Company by introducing new processes and indicators. Katzenbach and Harshak (2011) believe that no matter the directives such leaders try to issue, they will rarely achieve their aspirations because of the cultural resistance.

According to Tellis et al. (2009), "attitudes are a more proximate driver of innovation than practices". Consequently, the mindset with which people approach a given situation has more weight than how the controls in place measure their performance. According to Rao and Weintraub (2013), "people change when they see their peers become more productive, engaged and successful". Indeed, "it is much easier to act your way into new thinking than to think your way into new actions" (Katzenbach & Harshak, 2011). Katzenbach and Harshak (2011) explain that the focus must be on changing the behaviour rather than changing the culture directly. The authors believe that "direct experience trumps the old beliefs of an established culture" and it is easier to change a culture when the experience is reinforced by other people (Katzenbach & Harshak, 2011).

Schein (2009) recommends to "always think first of the culture as your source of strength." Indeed, one way to approach culture change is to build on the positive elements of the existing culture by

focusing “on specific behaviours that solve real problems and deliver real results” (Katzenbach & Harshak, 2011). Another approach could be to integrate two cultures within the same organization: one oriented toward operational excellence and the other toward innovation. This is the case of ambidextrous organizations (Gibson & Birkinshaw, 2004; O'Reilly III & Tushman, 2004).

Yes, culture is “unique, intangible, sticky, and difficult to change” (Tellis et al., 2009), but maybe culture change is the only real lasting change possible. Hence, the **fifth** and last **conclusion** is as follows:

> *The organizational culture has to be transformed to achieve real change and the way to do it is through behaviour change.*

This opens up multiple research possibilities on the appropriate behaviours to develop in order to favour the development of Innovation Capabilities and how to encourage such behaviours.

5.2 Concluding Proposition and Future Research

Findings and propositions from this study support the idiosyncratic nature of innovation performance measurement (Brophey et al., 2013). Based on this case study, it seems like the maturity level of innovation processes has an impact on the types of KPIs that would be appropriate to develop Innovation Capabilities. Indeed, the factors that influence Innovation Capabilities, such as risk tolerance, strategic alignment and corporate culture, evolve during a company’s life. An innovative start-up has very different KPI needs than an established innovative company such as 3M or Apple. Consequently, research must go further than comparing companies’ needs and characteristics by size and industry. We must understand where they are at in their life story. Moreover, while the typical BPM maturity models propose KPI development at level 3, research has shown that there is value in performance measurement at different stages of a company’s life (Busby & Williamson, 2000; Godener & Soderquist, 2004; Kuratko, Covin, et al., 2014). However, KPIs with different goals are appropriate for different levels of maturity. A company’s innovation management maturity level impacts the types of KPIs that will be appropriate to increase the company’s Innovation Capabilities. Thus, to conclude this study we posit the following **hypothesis**:

> *Different types of KPIs are appropriate for different levels of innovation management maturity.*

From this study, we propose that at maturity levels 1 and 2, KPIs with the goal to drive behaviours conducive to innovation are most appropriate. Moreover, at level 3, the development of KPIs to measure achievement will be appropriate. This study did not provide the opportunity for propositions of appropriate KPIs at higher maturity levels.

The proposed hypothesis as well as the rest of this study findings provide possibilities for several future research subjects of different research types. The proposed hypothesis could be tested with a deductive approach by looking at correlations between the types of KPIs and the level of maturity in multiple innovative companies. On the other hand, the proposed hypothesis can be explored further through a longitudinal theory building research designed to follow the evolution of several enterprises in order to better understand the relationships between their maturity, PMS, Culture and Innovation Capabilities.

In addition, each of the four propositions as well as the conceptual framework presented in Chapter 4 can also be subjects for future inductive or deductive research. In fact, preliminary work has already been done by Lacasse (2017) to develop methodology to test the validity of an earlier version of the conceptual framework. Moreover, the Case Study was carried out in a specific manufacturing company with an execution-oriented culture. There is interest in comparing its challenges and outcomes with companies of a similar profile as well as different types of companies in order to further the academic understanding on the key factors influencing the development of Innovation Capabilities through PMS implementation and culture change.

Future research in the Partner Company would also be beneficial in order to see if the desired behaviour changes occurred in the case if the proposed KPIs are implemented. If not, it would be important to better understand the reasons behind the rejection of the KPIs proposed as part of this study.

Finally, it is part of a typical company life cycle to go from innovative to bureaucratic. Therefore, beyond understanding how to rejuvenate a company’s Innovation Capabilities, more work can be done to comprehend how to preserve an innovative culture through time and growth as few companies succeed in this.

5.3 Contributions and Limitations

This research contributes learning from an intervention-research case study in a manufacturing company. Its first contribution is methodological with a unique field research design with the aim to help bridge the gap between practice and literature. The author's hope is that it can inspire more field research in order to provide a better balance between the dominant deductive and the less popular inductive research in innovation management (Hlady-Rispal, 2016).

Several theories and guidelines from literature where used to propose appropriate innovation KPIs in the Partner Company with an execution-oriented culture. The challenges met allowed to elaborate four propositions and a conceptual framework regarding the dynamic relationship between Intrapreneurial Culture, PMS and Corporate Innovation Capabilities. While the results from a Case Study cannot be generalized, they are meant to provide insights and ideas for future work as suggested in section 5.2.

It is the author's hope that learnings from this study can contribute to practitioners wishing to rejuvenate their company's Innovation Capabilities. Some practitioners might be tempted to take what seems like the easy path through the implementation of new processes, tools and PMS. This research shows that, at least in some circumstances, it is the difficult path. While culture change is often frightening because of its uniqueness and 'stickiness', it might actually be the right path to take by approaching it through behaviour change.

Indeed, the mandate carried out at the Partner Company changed from developing KPIs to measure innovation success to developing KPIs that could drive the right behaviours to develop better Innovation Capabilities. An important learning from this study supported by literature (Katzenbach & Harshak, 2011; M. H. Morris et al., 2006; Tellis et al., 2009) is that organizational change goes through behaviour change, even when implementing a PMS.

There is certainly no unique way to develop the appropriate KPIs and there are no universally 'perfect' KPIs to drive innovative behaviours. What is important is to clearly understand which behaviours need to change, what behaviours have to be encouraged or restricted, and then choose the KPIs accordingly. While behaviour and culture change take time, there are always other ways for an established company to make space for innovation. Heavyweight teams or spin-offs can be a temporary or even a long term solution to a company's lack of Innovation Capabilities.

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APPENDIX A – INTERVIEW GUIDES

More information regarding the context and the interview questions for the three sets of interviews presented in section 3.5.3.3 is provided in this Appendix.

Project Charter Discussions

The project charter interviews were held at the beginning of the mandate with the Partner Company to share the author's project charter regarding the Innovation KPI development project with the relevant Company innovation stakeholders. It was a good way to introduce the researcher and get to know the stakeholders. The project charter was sent beforehand for the interviewees to have time to look at it before the interviews.

The author introduced herself, her background and her role at the Company at the beginning of each interview. The interviews were semi-structured. The following questions were used to guide and open the discussions. They were not always asked in the same order, it depended on how the discussion was going.

1. Before we begin, do you have any first impressions, thoughts, or questions to share regarding the charter, the described project in general, or innovation at the Company?
2. Do you think the project with its scope and timeline is realistic? Please elaborate, why yes or why no.
3. Do you see any bottlenecks that I might meet?
4. Do you see any possible risks?
5. According to you, who are the most important people to interview regarding this project? Why? Did I miss any in my first listing?
6. Are there any stakeholders that could support me in any way with this project?
7. As I am new to this Company, are there any things concerning the Company, its employees and its ways of working that I should know?
8. Can you tell me what 'being innovative' means to you?

Previous KPI Data Collection

These interviews were held with stakeholders that had worked or were working on specific innovation projects. The main goal was to collect as much indicators as possible regarding these projects, specifically about the resources spent as well as related sales if any. The projects under investigation were those that were identified with the IRDT Director, and the VPs of Engineering and Marketing, as ‘New’ with sales over the last 5 years. The ‘New’ included new-to-the-world, new-to-the-Company, major improvements, products that resulted in opening new markets or increased market share.

As most of the stakeholders involved in these interviews were engineers passionate about their projects, this resulted in much more than a hunt for numbers. Moreover, this exposed in detail the problem of siloed data management systems. Most stakeholders had personalized spreadsheets to manage information regarding their projects.

Each interview was concerning specific projects on which the interviewee had worked on, and was semi-structured in the hope to receive more information than only performance indicators. The following guiding questions were used in varying order and helped start the conversations:

1. Do you have any information on the resources spent on this project? This includes man-hours and test material?
2. Do you have any information on the sales related to this product development? To what client? What quantity? When? For how much?
3. Was this innovation directly related to a customer order?
4. What is an innovative product according to you?
5. How would you classify this product in terms of ‘innovativeness’ based on your previous answer?
6. Do you agree with the way this product was classified by the management? Please elaborate why yes or why not.

Mid-term Innovation KPI Proposal

After 5 months on the field, a first proposition of KPIs was developed for discussion purposes and presented to 11 stakeholders for feedback. A short document presenting these KPIs was developed and sent before each interview to the involved stakeholders. The following questions were used to guide these semi-structured interviews:

1. Before we begin, do you have any first impressions, thoughts, or questions on the KPIs presented in the document I sent you?
2. What do you think about the proposed KPIs?
3. Do you think the proposed KPIs cover all the important dimensions? Is there something missing?
4. How difficult do you think these KPIs will be to implement? Why?

APPENDIX B – HIGH-LEVEL WORKSHOP OUTLINES

The high-level outlines of each of the workshops developed are presented in this Appendix.

Workshop 1: KPI Requirements Definition

The following structure was used to guide the workshop discussions and activities:

1. Why is it important for you to measure innovation performance? For what kind of use?
    1.1. Each lists his top personal reasons;
    1.2. Everyone shares the reasons which are noted on a flipchart.
2. What does successful innovation mean to each of you?
    2.1. Think of a recent innovation outside your industry that really impressed you.
        2.1.1. Write on separate post-its the 2-3 main reasons why this innovation is so impressively innovative to you.
        2.1.2. Everyone shares with the group and the post-its are grouped in categories on a flipchart.
        2.1.3. Follows a discussion on what stands out the most.
    2.2. Think of an important innovation in your industry (your Company or other) that has been successful and that would have the aspects/characteristics that we just discussed in 2.1.2.
        2.2.1. What made it successful?
        2.2.2. Please share if you know what the innovation process looked like.
3. How do our discussions so far connect with the current Company vision and goals?
    3.1. Is there anything important missing in our discussions compared to the Company's high-level goals?
    3.2. Take a few minutes to answer individually on separate post-its the following core BSC questions:
        3.2.1. To achieve our vision, how should we appear to customers in regard to innovation?
        3.2.2. To satisfy our customers, what business processes must we excel at in regard to innovation?
        3.2.3. To achieve our vision, how can we sustain our ability to change and improve?
    3.3. Please share, we will group similar post-its together in categories.

4. Of everything we have discussed, what is the one thing about innovation that you would like to see at the Company?

    4.1. Everyone shares their post-its that are grouped when possible and presented on a flipchart;

    4.2. Each participant has three dots in order to vote on what is the most important for the Company. The three votes can be split between one or two post-its or can be all used for one post-it.

Workshop 2: Innovation System Mapping

The following structure was used to guide the workshop discussions and activities:

1. List all internal and external stakeholders on separate post-its.
2. Draw links between stakeholders based on the following questions:
    - What do we know about the customers' needs?
        - Through what channels does the Company currently get information on customers' needs?
    - What kind of feedback does the Company get on their innovative products?
        - Through what channels/stakeholders does the Company get this feedback?
    - How does the Company do market research?
    - What kind of spaces (internal and external) does the Company have/use in order to learn about its unknown needs?
    - How does the Company spread information about its innovation to customers?
        - Through what channels?
    - What other knowledge sharing mechanisms exist to share information about the Company's innovation?
    - Through what channels is alignment with the Company's mission ensured?

APPENDIX C – IQ QUESTIONNAIRE STATEMENTS

The questionnaire is composed of 54 statements that must be ranked on a scale of 1 to 5, where 1 means ‘not at all’ and 5 stands for ‘to a very great extent’. The 54 statements are presented in this section and grouped by ‘Factor’ and ‘Building Block’.

Table C.1: Questionnaire Questions for the Values and Behaviours Building Blocks

Block	Factor	Element	Statement
Values	Entrepreneurial	Hungry	We have a burning desire to explore opportunities and to create new things.
		Ambiguity	We have a healthy appetite and tolerance for ambiguity when pursuing new opportunities.
		Action-oriented	We avoid analysis paralysis when we identify new opportunities by exhibiting a bias towards action.
	Creativity	Imagination	We encourage new ways of thinking and solutions from diverse perspectives.
		Autonomy	Our workplace provides us the freedom to pursue new opportunities.
		Playful	We take delight in being spontaneous and are not afraid to laugh at ourselves.
	Learning	Curiosity	We are good at asking questions in the pursuit of the unknown.
		Experiment	We are constantly experimenting in our innovation efforts.
		Failure OK	We are not afraid to fail, and we treat failure as a learning opportunity.
Behaviors	Energize	Inspire	Our leaders inspire us with a vision for the future and articulation of opportunities for the organization.
		Challenge	Our leaders frequently challenge us to think and act entrepreneurially.
		Model	Our leaders model the right innovation behaviors for others to follow.
	Engage	Coach	Our leaders devote time to coach and provide feedback in our innovation efforts.
		Initiative	In our organization, people at all levels proactively take initiative to innovate.
		Support	Our leaders provide support to project team members during both successes and failures.
	Enable	Influence	Our leaders use appropriate influence strategies to help us navigate around organizational obstacles.
		Adapt	Our leaders are able to modify and change course of action when needed.
		Grit	Our leaders persist in following opportunities even in the face of adversity.

Table C.2: Questionnaire Questions for the Climate and Resources Building Blocks

Block	Factor	Element	Statement
Climate	Collaboration	Community	We have a community that speaks a common language about innovation.
		Diversity	We appreciate, respect and leverage the differences that exist within our community.
		Teamwork	We work well together in teams to capture opportunities.
	Safety	Trust	We are consistent in actually doing the things that we say we value.
		Integrity	We question decisions and actions that are inconsistent with our values.
		Openness	We are able to freely voice our opinions, even about unconventional or controversial ideas.
	Simplicity	No bureaucracy	We minimize rules, policies, bureaucracy and rigidity to simplify our workplace.
		Accountability	People take responsibility for their own actions and avoid blaming others.
		Decision-making	Our people know exactly how to get started and move initiatives through the organization.
Resources	People	Champions	We have committed leaders who are willing to be champions of innovation.
		Experts	We have access to innovation experts who can support our projects.
		Talent	We have the internal talent to succeed in our innovation projects.
	Systems	Selection	We have the right recruiting and hiring systems in place to support a culture of innovation.
		Communication	We have good collaboration tools to support our innovation efforts.
		Ecosystem	We are good at leveraging our relationships with suppliers and vendors to pursue innovation.
	Projects	Time	We give people dedicated time to pursue new opportunities.
		Money	We have dedicated finances to pursue new opportunities.
		Space	We have dedicated physical and/or virtual space to pursue new opportunities.

Table C.3: Questionnaire Questions for the Processes and Success Building Blocks

Block	Factor	Element	Statement
Processes	Ideate	Generate	We systematically generate ideas from a vast and diverse set of sources.
		Filter	We methodically filter and refine ideas to identify the most promising opportunities.
		Prioritize	We select opportunities based on a clearly articulated risk portfolio.
	Shape	Prototype	We move promising opportunities quickly into prototyping.
		Iterate	We have effective feedback loops between our organization and the voice of the customer.
		Fail smart	We quickly stop projects based on predefined failure criteria.
	Capture	Flexibility	Our processes are tailored to be flexible and context-based rather than control- and bureaucracy-based.
		Launch	We quickly go to market with the most promising opportunities.
		Scale	We rapidly allocate resources to scale initiatives that show market promise.
Success	External	Customers	Our customers think of us as an innovative organization.
		Competitors	Our innovation performance is much better than other firms in our industry.
		Financial	Our innovation efforts have led us to better financial performance than others in our industry.
	Enterprise	Purpose	We treat innovation as a long-term strategy rather than a short-term fix.
		Discipline	We have a deliberate, comprehensive and disciplined approach to innovation.
		Capabilities	Our innovation projects have helped our organization develop new capabilities that we did not have three years ago.
	Individual	Satisfaction	I am satisfied with my level of participation in our innovation initiatives.
		Growth	We deliberately stretch and build our people's competencies by their participation in new initiatives.
		Reward	We reward people for participating in potentially risky opportunities, irrespective of the outcome.

APPENDIX D – COMPLETE IQ QUESTIONNAIRE RESULTS

All the detailed IQ questionnaire scores are presented in this Appendix. The overall score is 2.5 and it corresponds to the average of the six building block scores.

Table D.1: Questionnaire Scores for the Values, Behaviours and Climate Building Blocks

Element	Element Score	Factor	Factor Score	Building Block	Building Block Score
Hungry	3.1	Entrepreneurial	2.8	Values	2.7
Ambiguity	2.7				
Action-oriented	2.5				
Imagination	2.7	Creativity	2.6		
Autonomy	2.6				
Playful	2.5				
Curiosity	3.2	Learning	2.8		
Experiment	3.0				
Failure OK	2.3				
Inspire	3.1	Energize	2.9	Behaviours	2.6
Challenge	3.0				
Model	2.5				
Coach	2.0	Engage	2.2		
Initiative	1.9				
Support	2.6				
Influence	2.6	Enable	2.9		
Adapt	3.0				
Grit	3.0				
Community	2.0	Collaboration	2.4	Climate	2.5
Diversity	2.9				
Teamwork	2.4				
Trust	2.5	Safety	2.9		
Integrity	3.0				
Openness	3.3				
No bureaucracy	2.3	Simplicity	2.2		
Accountability	2.3				
Decision-making	1.9				

Table D.2: Questionnaire Scores for the Resources, Processes and Success Building Blocks

Element	Element Score	Factor	Factor Score	Building Block	Building Block Score
Champions	2.9	People	3.1	Resources	2.6
Experts	2.9				
Talent	3.4				
Selection	2.3	Systems	2.3		
Communication	2.3				
Ecosystem	2.4				
Time	2.2	Projects	2.5		
Money	2.7				
Space	2.6				
Generate	2.4	Ideate	2.3	Processes	2.1
Filter	2.3				
Prioritize	2.3				
Prototype	2.1	Shape	1.9		
Iterate	1.7				
Fail smart	2.0				
Flexibility	2.2	Capture	2.0		
Launch	2.0				
Scale	2.0				
Customers	2.7	External	2.6	Success	2.6
Competitors	2.6				
Financial	2.5				
Purpose	2.7	Enterprise	2.8		
Discipline	2.7				
Capabilities	3.0				
Satisfaction	2.5	Individual	2.3		
Growth	2.6				
Reward	1.9				

APPENDIX E – IQ SCORES DISTRIBUTION GRAPHS

The score distributions for each of the 54 IQ questionnaire elements, as well as the 18 factors are presented in this Appendix. Each graph illustrates the distribution of a factor with its three elements. The graphs are grouped by building block.

Score Distributions for the Values Building Block

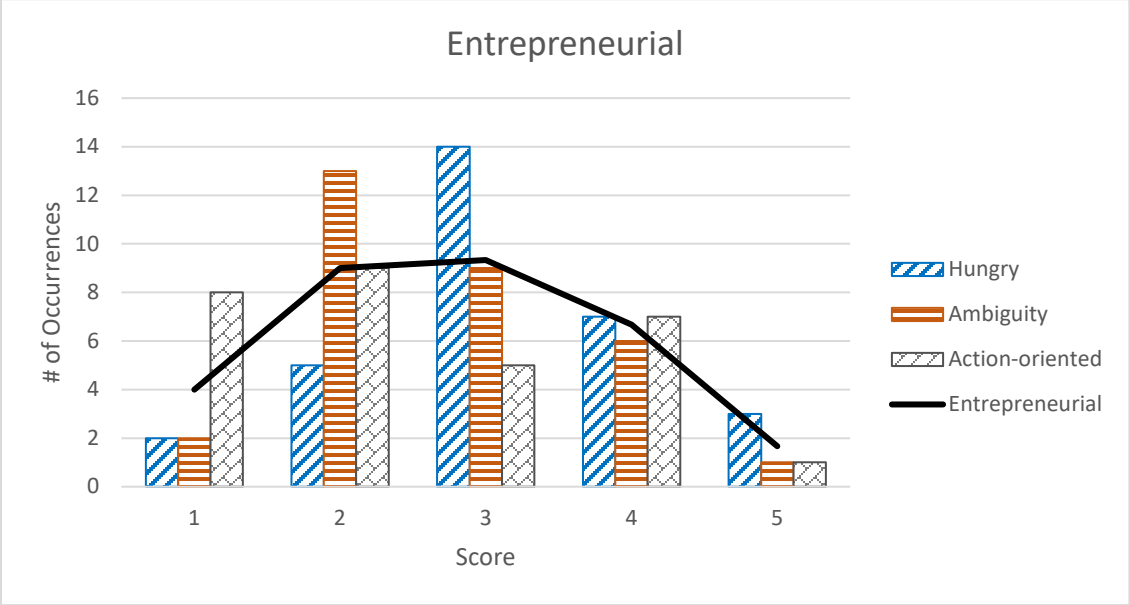

Figure E.1: Score Distributions for the Entrepreneurial Factor

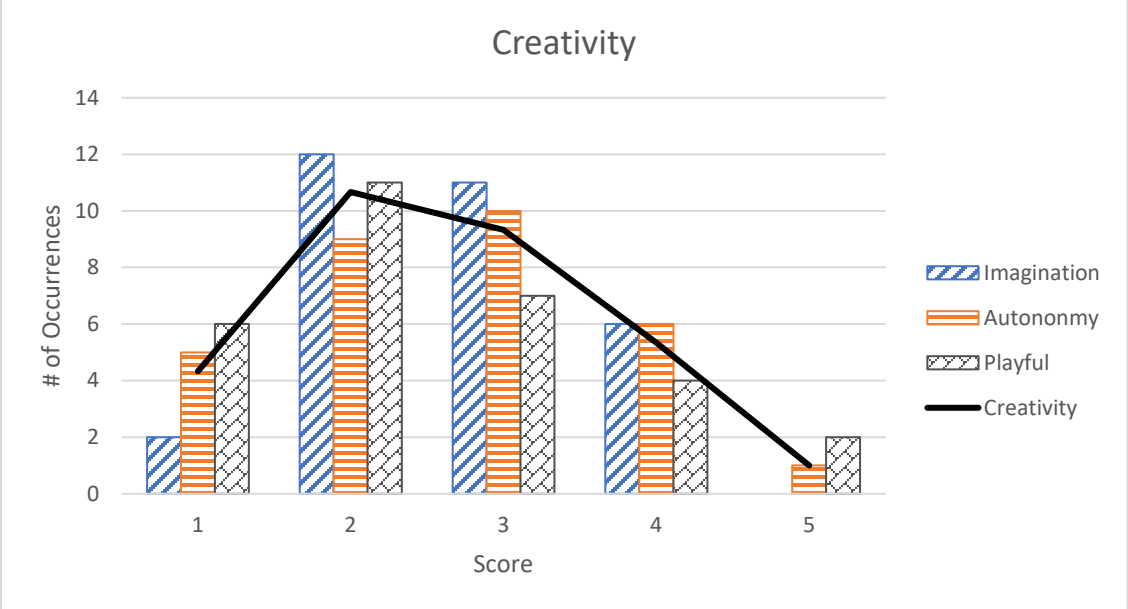

Figure E.2: Score Distributions for the Creativity Factor

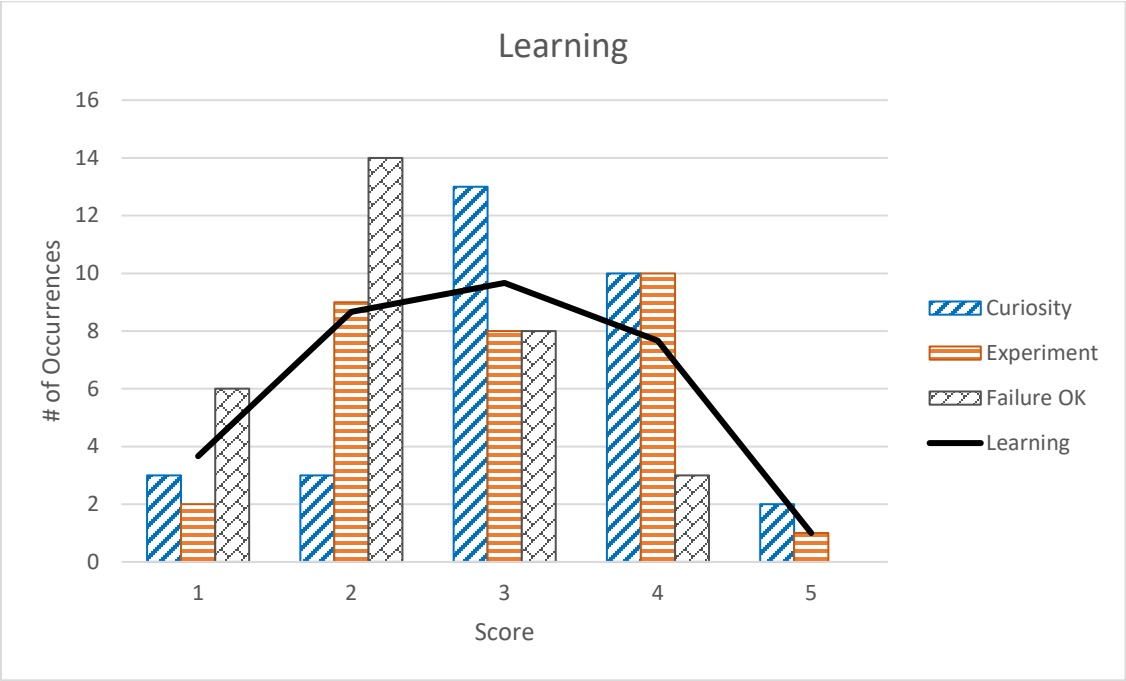

Figure E.3: Score Distributions for the Learning Factor

Score Distributions for the Behaviours Building Block

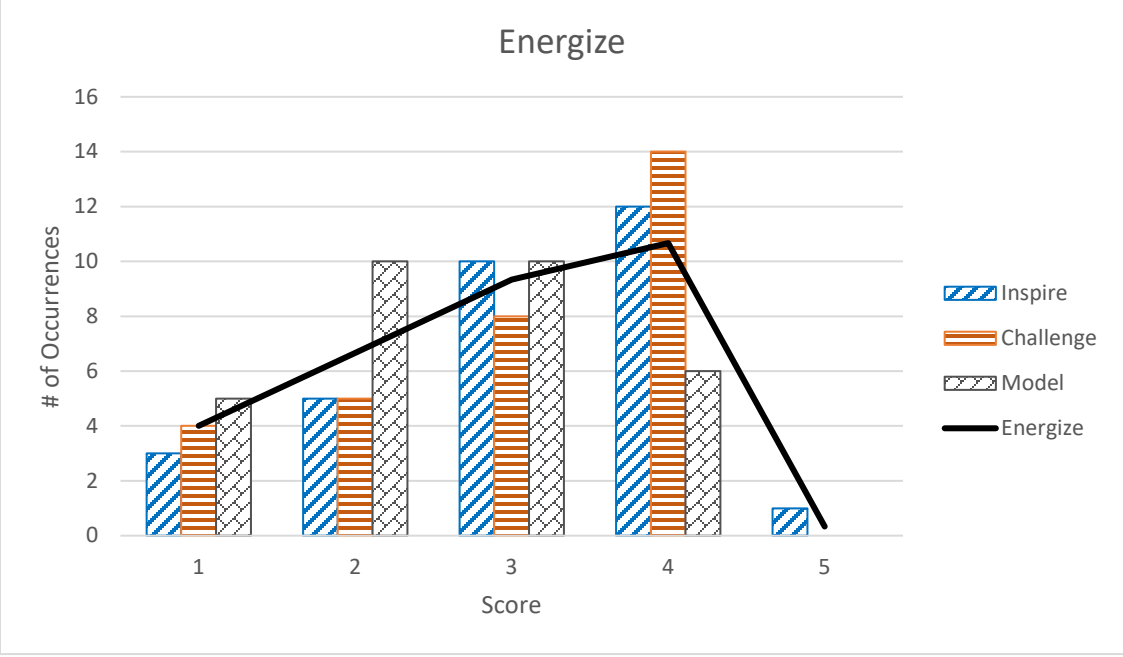

Figure E.4: Score Distributions for the Energize Factor

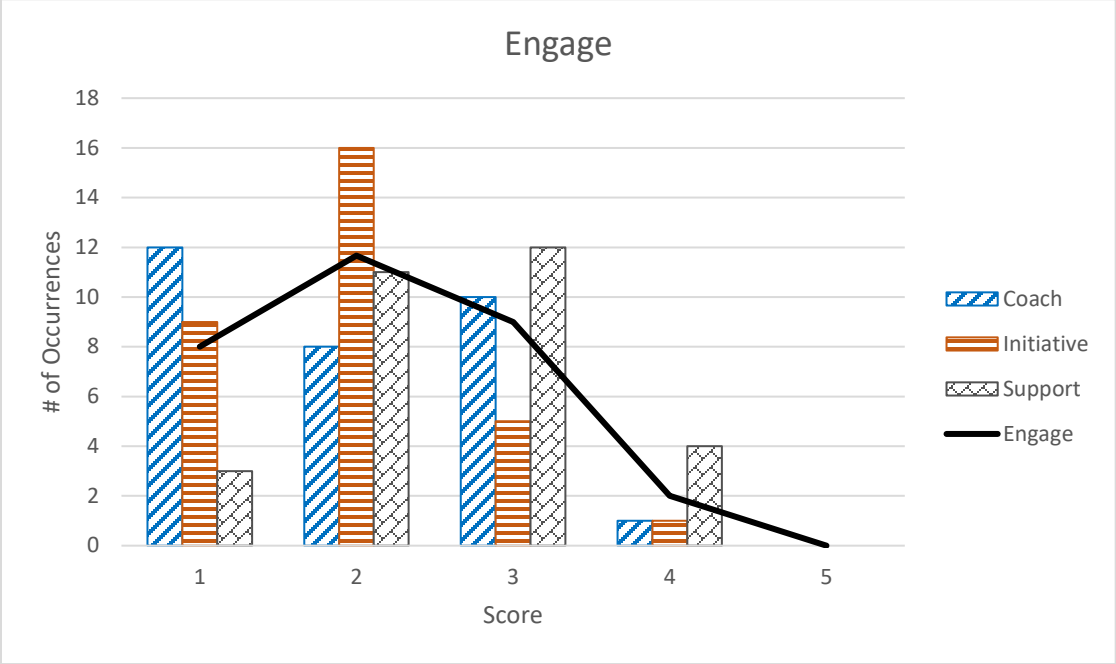

Figure E.5: Score Distributions for the Engage Factor

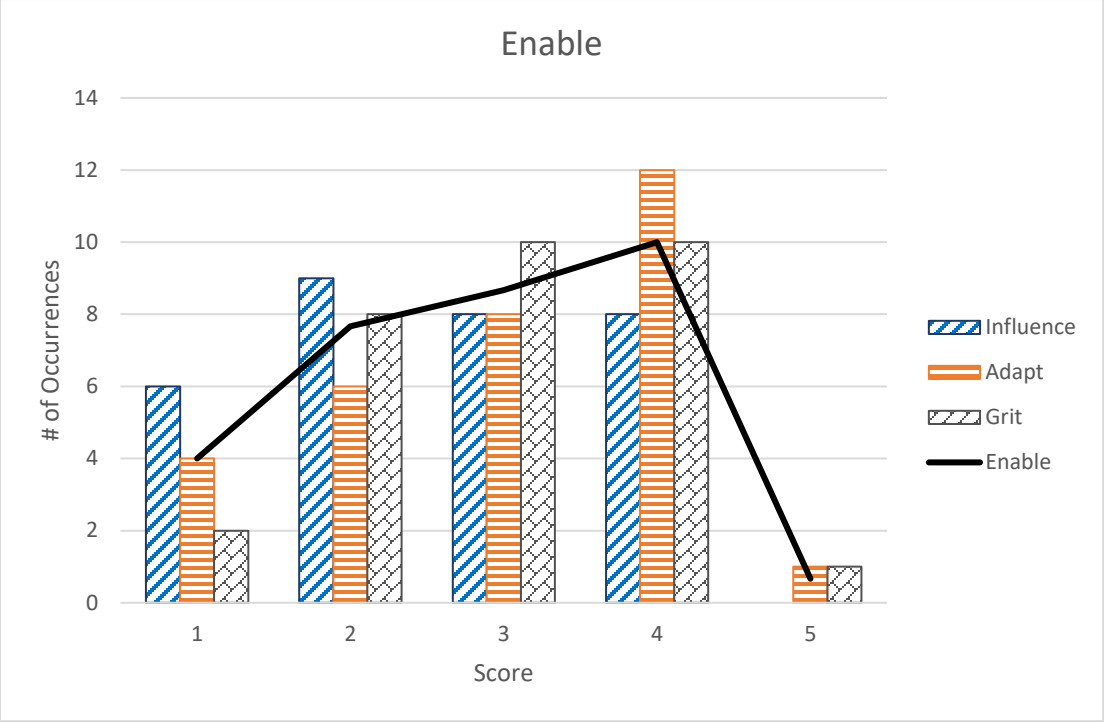

Figure E.6: Score Distributions for the Enable Factor

Score Distributions for the Climate Building Block

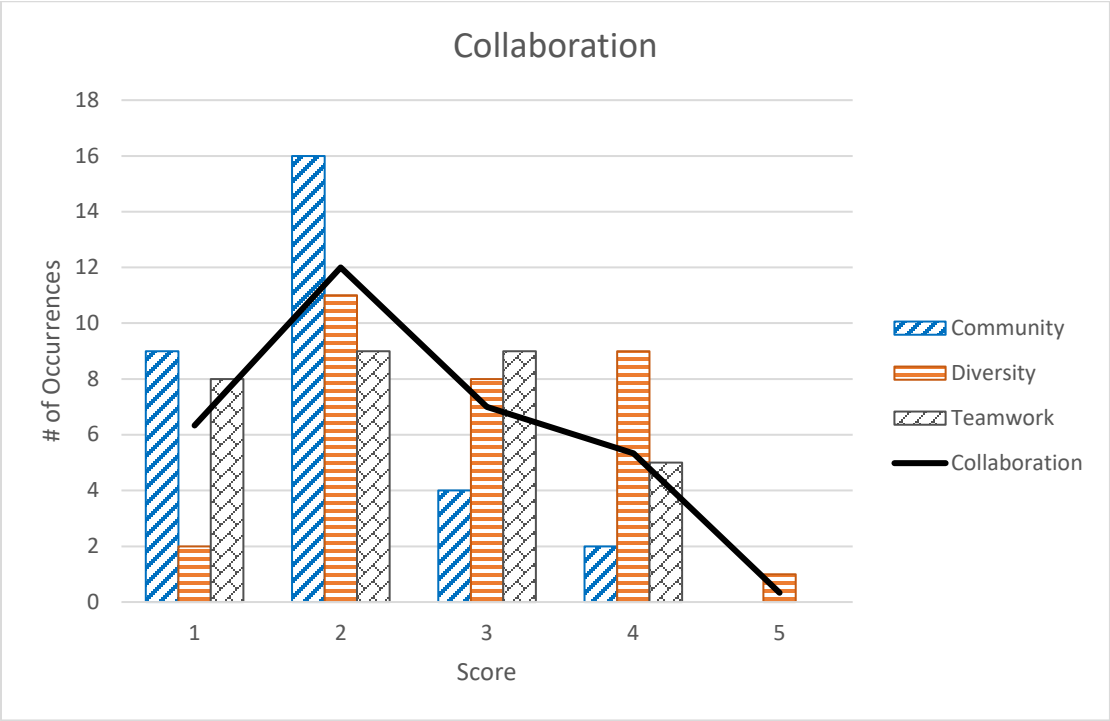

Figure E.7 Score Distributions for the Collaboration Factor

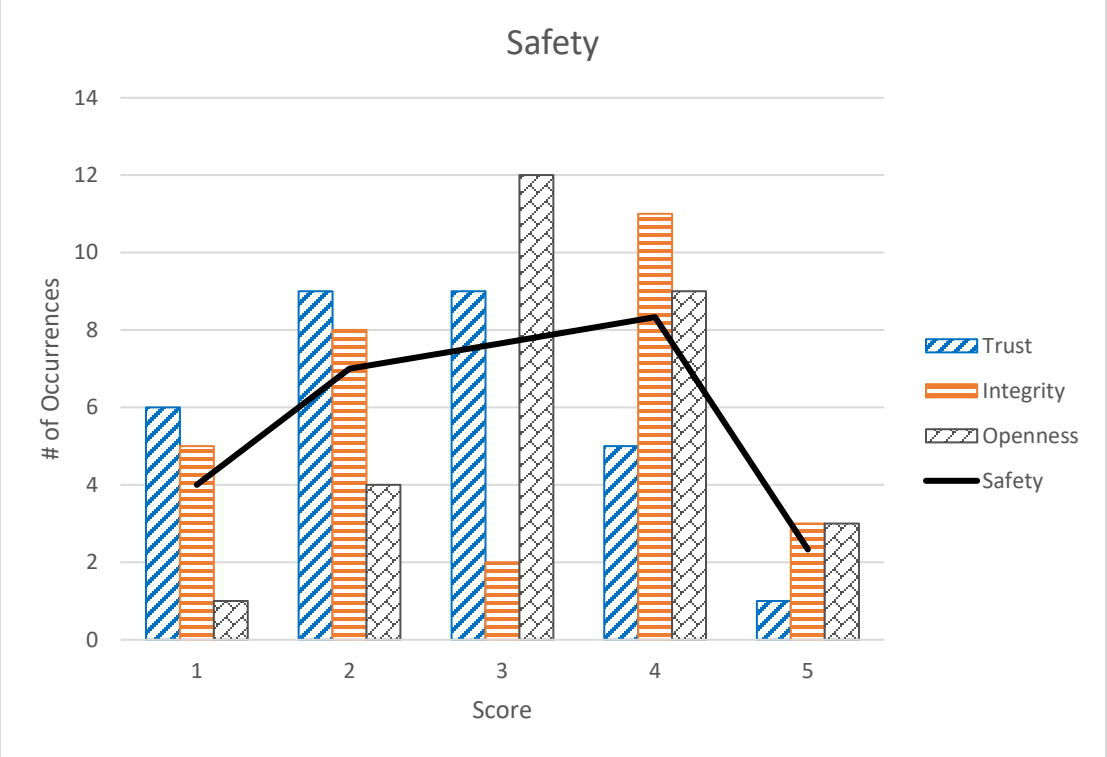

Figure E.8: Score Distributions for the Safety Factor

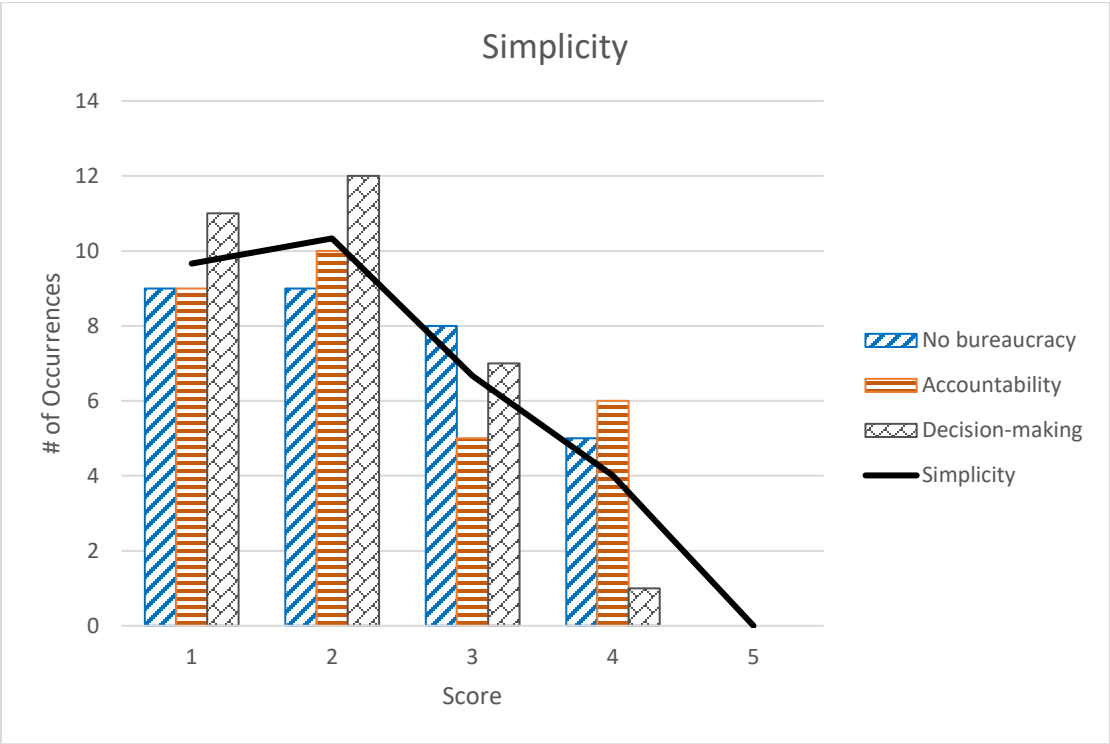

Figure E.9: Score Distributions for the Simplicity Factor

Score Distributions for the Resources Building Block

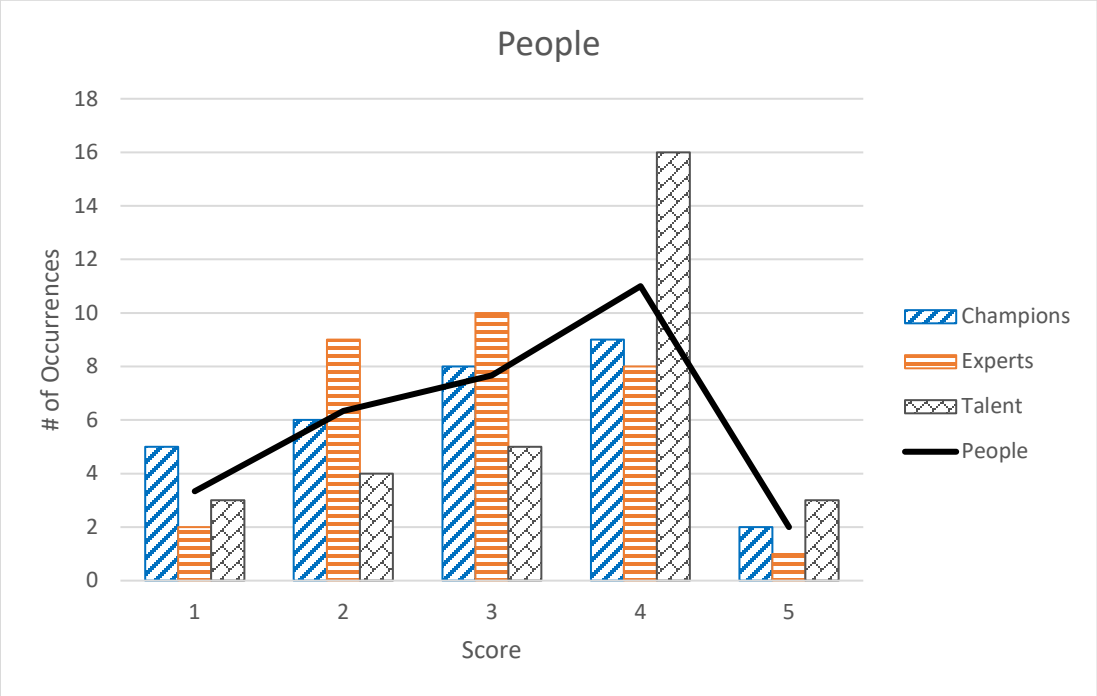

Figure E.10: Score Distributions for the People Factor

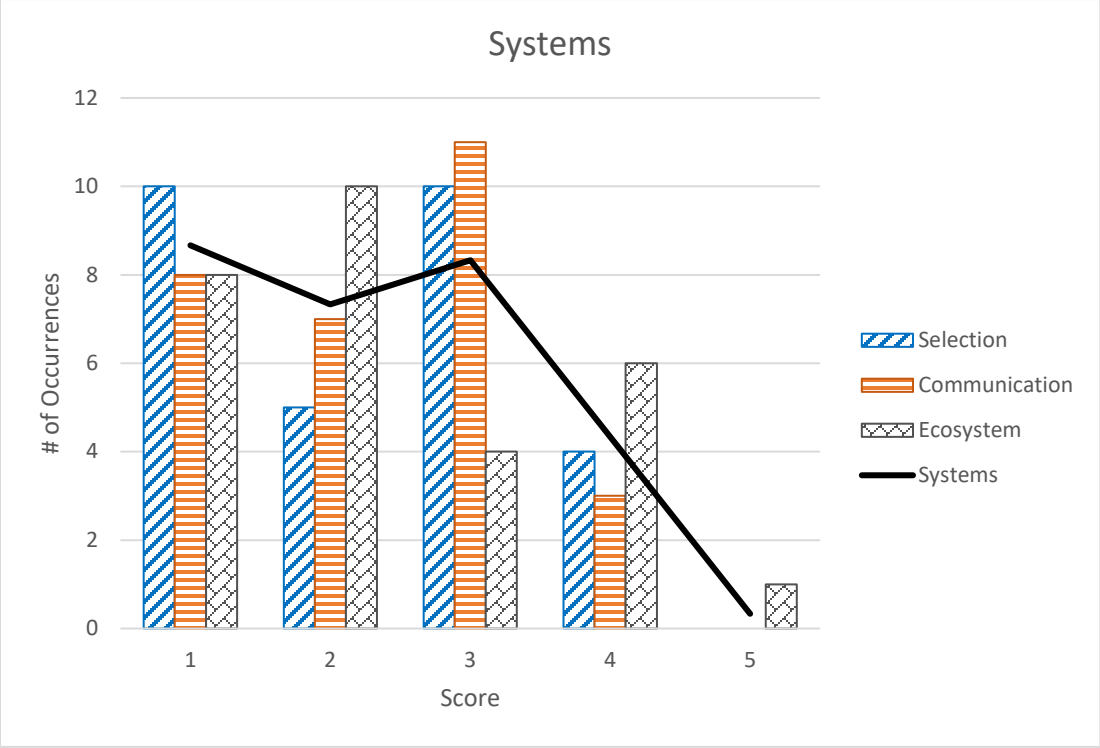

Figure E.11: Score Distributions for the Systems Factor

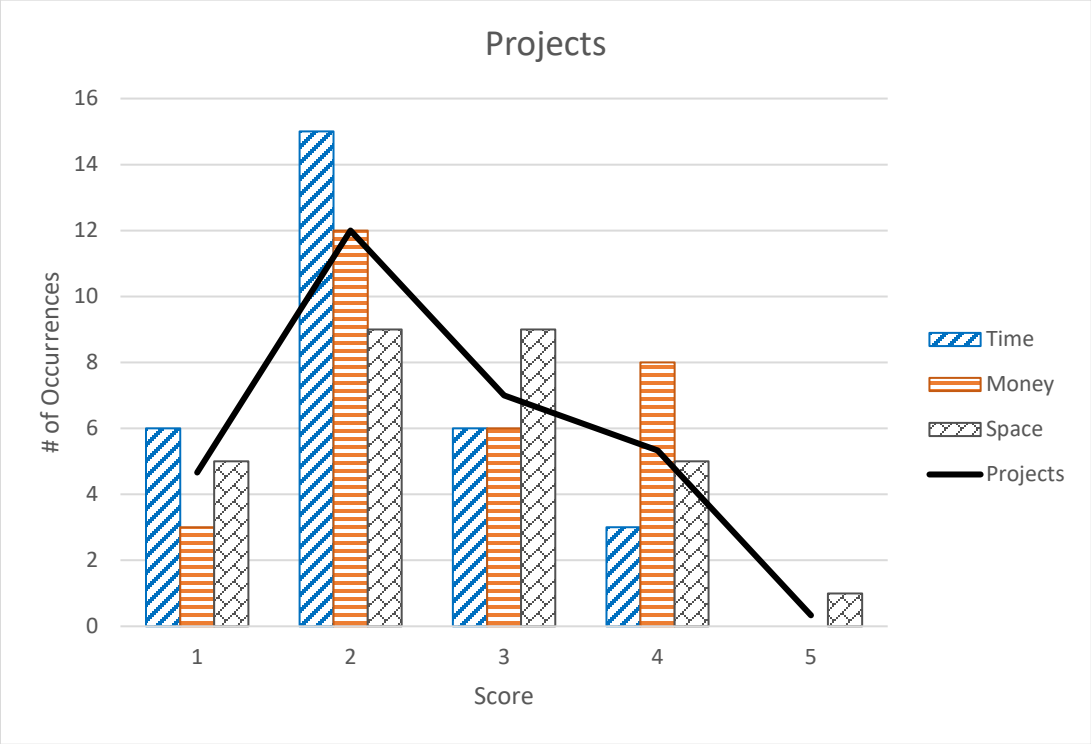

Figure E.12: Score Distributions for the Projects Factor

Score Distributions for the Processes Building Block

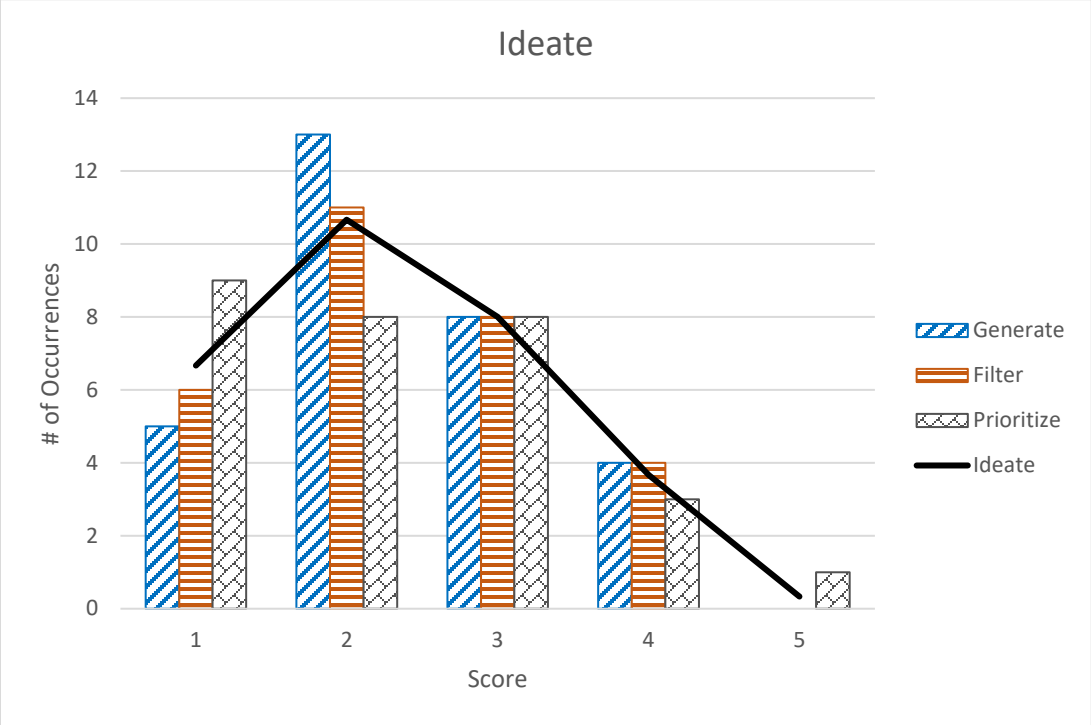

Figure E.13: Score Distributions for the Ideate Factor

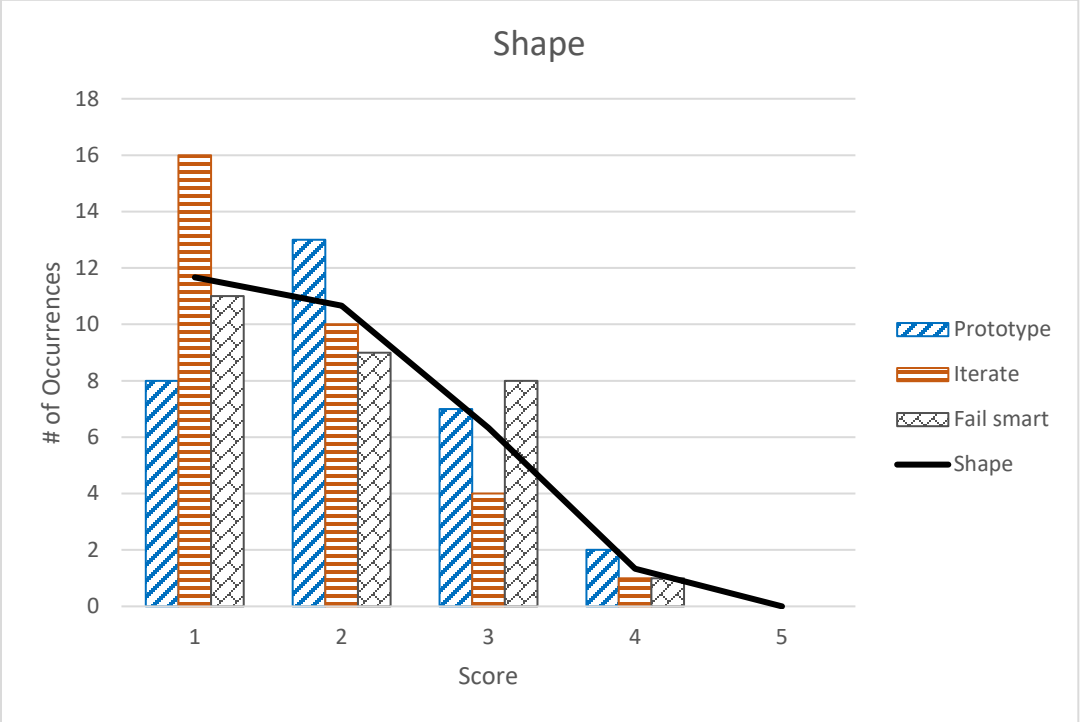

Figure E.14: Score Distributions for the Shape Factor

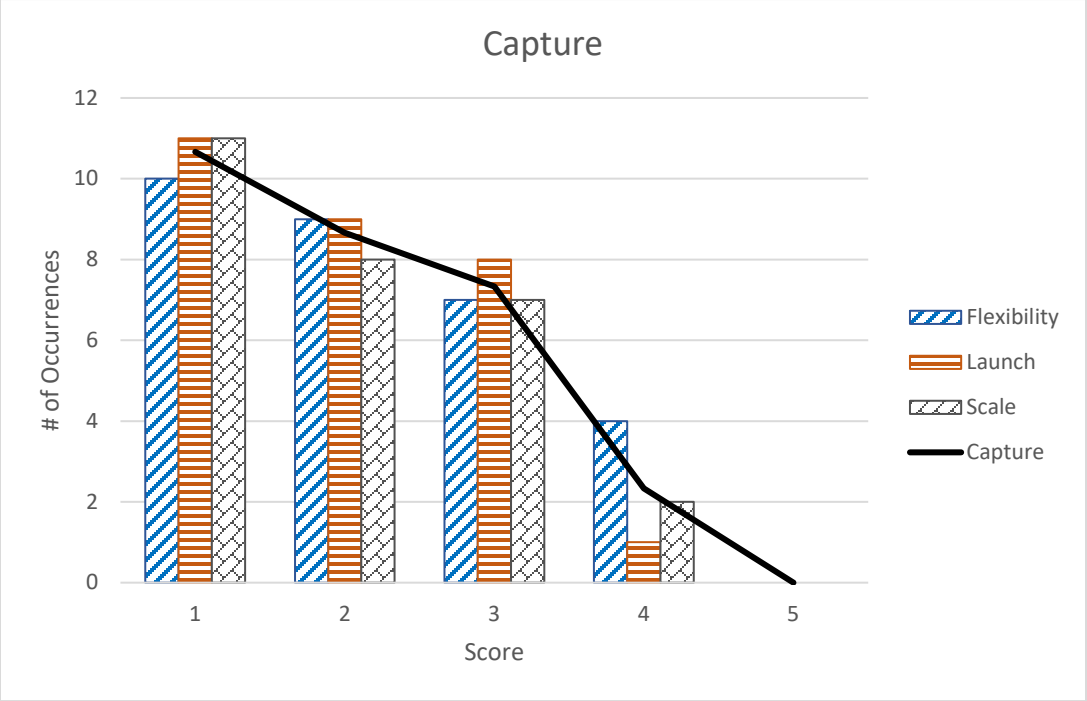

Figure E.15: Score Distributions for the Capture Factor

Score Distributions for the Success Building Block

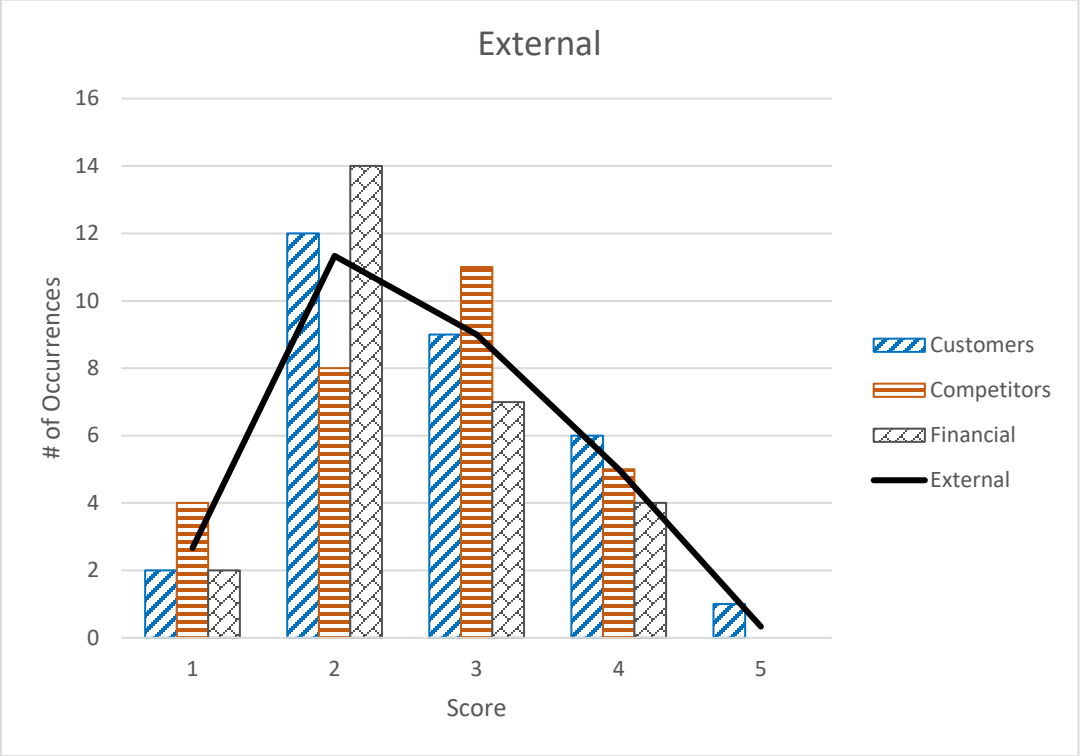

Figure E.16: Score Distributions for the External Factor

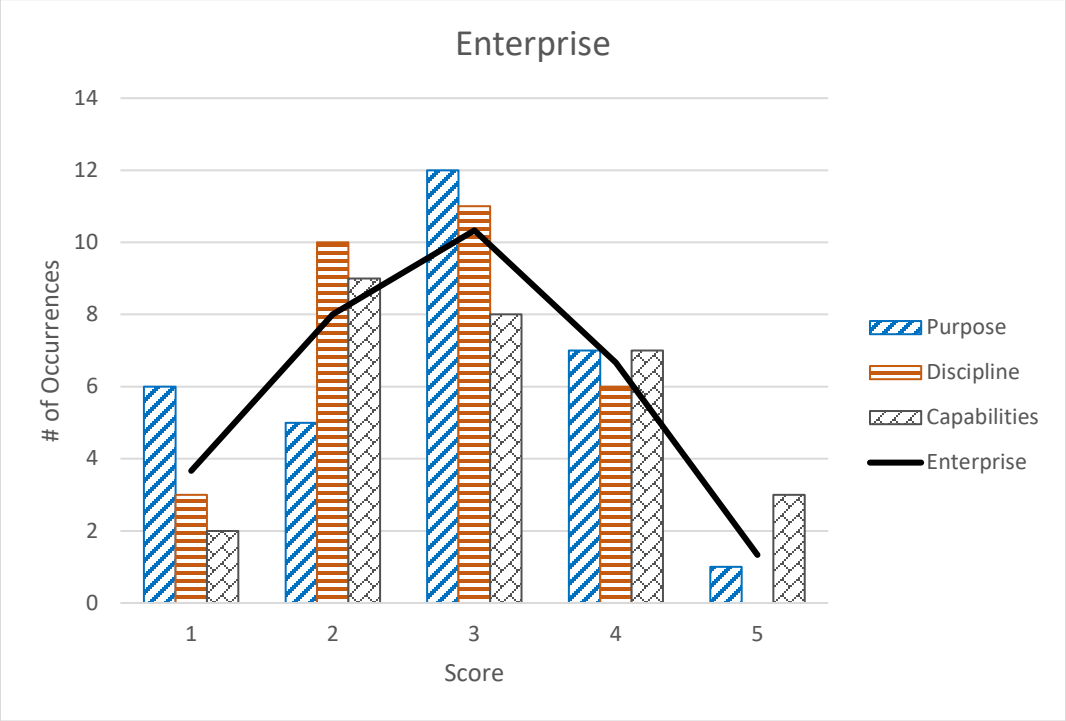

Figure E.17: Score Distributions for the Enterprise Factor

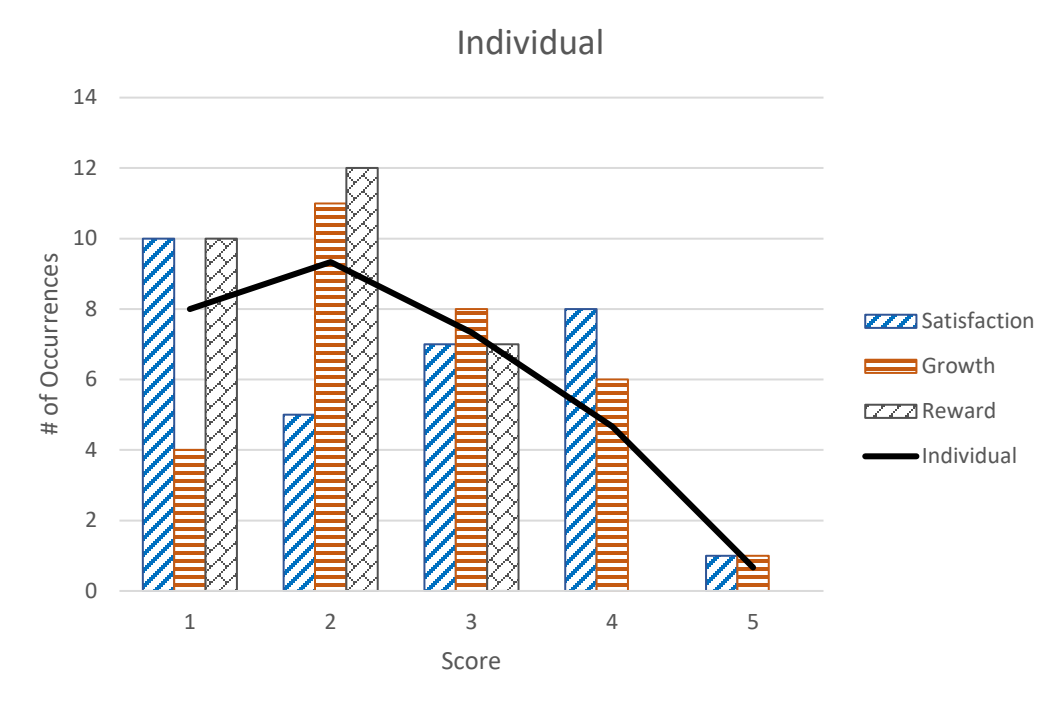

Figure E.18: Score Distributions for the Individual Factor

APPENDIX F – PERCENTAGE OF RESPONDENTS BY DEPARTMENT

The detailed breakdown of the respondents per department is presented in this Appendix.

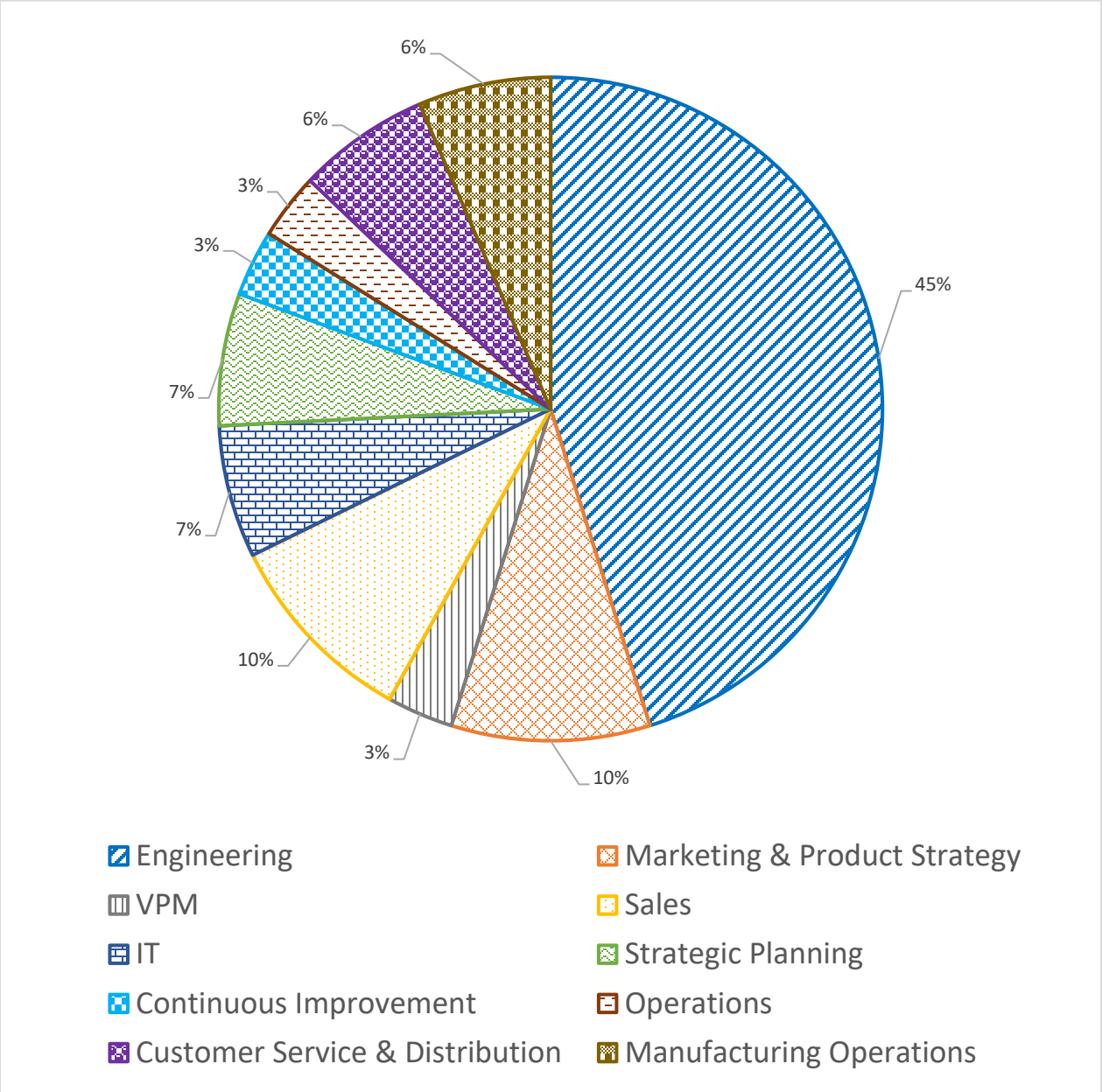

Figure F.1: Percentage of Respondents by Department

APPENDIX G – APPLICATION OF RESEARCH PROPOSITIONS IN CONCEPTUAL FRAMEWORK

The application of Proposition 2 in the proposed conceptual framework is presented in Figure G.1. The application of Propositions 3 and 4 in the conceptual framework is presented in Figure G.2.

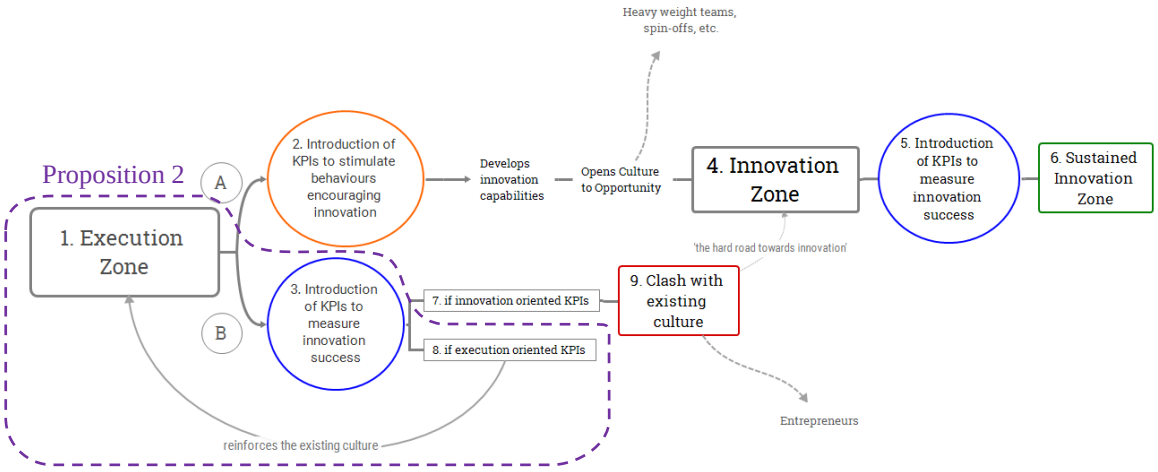

Figure G.1: Application of Proposition 2 in Conceptual Framework

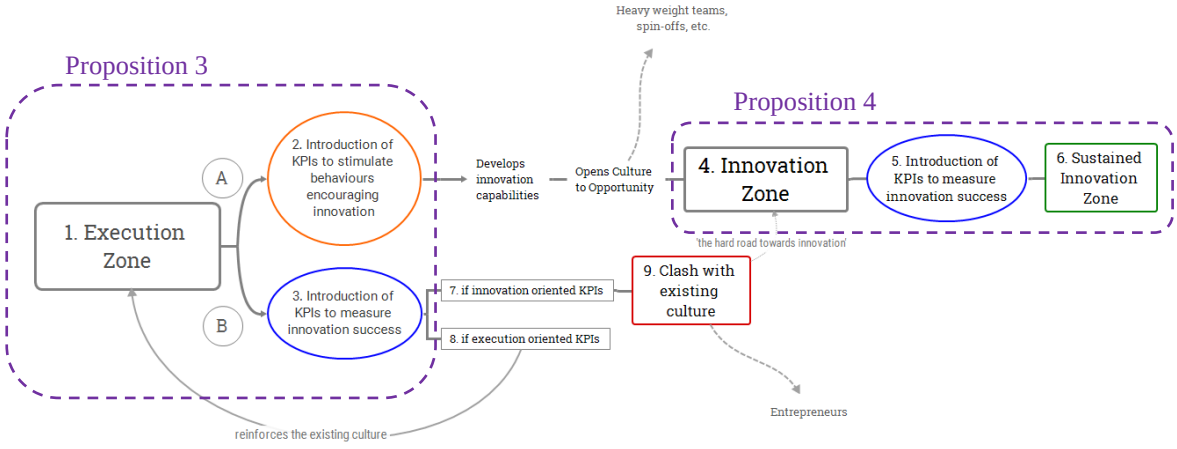

Figure G.2: Application of Propositions 3 and 4 in Conceptual Framework